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## THE NEW YORK GAS WAR ENDED.

Since June last the various companies by which the city of New York is furnished with gas have been indulging in the expensive luxury of either giving away gas, or selling it at a figure so ridiculously low that it is extremely difficult for any one posted in the business to understand where the companies could "get a new dollar for an old one" in the conduct of their business.

Prices have ranged from seventy-five cents to one dollar and a-half per thousand feet for the gas that was sold, while, in many cases, no doubt, there were many inducements extended in the way of free lamps, illuminations, etc., outside of hotels, theatres, and other large consumer's premises. In some of these instances the amount of gas given away must have exceeded that sold. The smallest consumers have been supplied at $1.50 per thousand, while those paying for 100,000 feet per month have been furnished at the rate of 75 cents per thousand.

Disastrous as all this may have been to the stockholder's dividends, the public generally have rejoiced in smaller bills, and consumers have been found who admitted that the difference in price was so great that it actually made a difference in the amount of the bill at the end of the month. This evidence in favor of the correctness of the meters, and the honesty of those making out the bills will, we fear, be soon forgotten in view of the following announcement, or one of the same import, which has been sent to every gas consumer during the past ten days:

NEW YORK, April 6th, 1880.

*To the Consumers of Gas—*

You are respectfully informed that on and after the 15th day of April, instant, the price of gas supplied by this company will be at the rate of ($2.25) two dollars and wenty-five cents per thousand cubic feet, *to all consumers.*

*Secy.* *Pres.*

From this it appears that the blessings of opposition or competition are at an end, and that the attempt at destroying each other has resulted in a love feast, at which the hatchet is buried in the ground, all statements of differences and superiority are thrown to the wind, and all gathering around th empty treasury, have shaken hands across the dead body of their darling "opposition," and concluded a treaty of peace. No more gas given away, no more reductions to large consumers, no more canvassing to get away each other's business, but the public is to be left to select for themselves who they will patronize; and in consideration of the benefits they have derived from competition in the past, they will now enjoy the privilege of footing the bills "at the rate of two twenty-five per thousand." "'Twas ever thus" from opposition's earliest hour, and so it will be to the end. Where two or more capitals are invested, two more sets of officials employed, and two or more sets of works constructed and operated to do the work of one, there can be but one result in the end, and that is a loss which, ultimately, the public must meet in one way or another.

The war may continue for a time, and low prices result, but a day of reckoning is sure to come, and that will surely show that some of the community are not as well off in the end as at the beginning. It is to be sincerely hoped that the experience of the past year will be sufficient for the New York companies, and that their united energies will now be employed in reasonably reducing the price of gas to their consumers, so far as is consistent with the cost of labor and materials (now everywhere on the increase), and the payment of fair dividends on a reasonable amount of capital stock.

The first step to be taken to bring about this result is to amalgamate all the companies into one, on basis of capital sufficient for the business; and in this connection we call especial attention to the details of the scheme for amalgamating the South Metropolitan and the Phœnix companies in London, which will be found in another column. It is to be borne in mind, however, that in England the capital represents money expended legitimately in plant, etc. Another good feature, and one which will remove many obstacles to amalgamation, is the method pursued in providing liberally for those officers and servants who are rendered supernumerary by the consolidation. This should be done in every case, and is a proper charge against the capital of the new establishment.

## Some Electrical Measurements of One of Mr. Edison's Horse-Shoe Lamps.

By Henry Morton, Ph.D., Alfred M. Mayer, Ph.D., and B. F. Thomas, A. M., at the Stevens Institute of Technology.

Much has been said and written within the last few months on the subject of Mr. Edison's new horseshoe lamps, and with all the writing and saying there has been wonderfully little produced in the way of precise and reliable statement concerning the simple primary facts, a knowledge of which would give the means of estimating both the scientific and commercial status of this widely discussed invention.

It was, therefore, with great pleasure that the present writers found themselves, through the kindness of the *Scientific American*, placed in possession of one of those horseshoe lamps of recent construction.

To satisfy themselves as to the real facts of the case they soon made a series of careful measurements and determinations, and as the results of these are likely to interest others, they now put them in print for general benefit.

A further examination of other lamps would have been made at the same time had opportunity offered; but as a communication on this subject addressed to Mr. Edison did not evoke a reply, they are obliged to content themselves with the one lamp as a subject of experiment.

They would, however, here remark that the behavior of this lamp, under the tests, and the agreement of its results with information otherwise obtained, convince them that it is at least a fair specimen of the lamps of this form so far produced at Menlo Park.

The first object, on receiving the lamp, was to determine roughly what amount and character of electric current would be needed to operate it efficiently. With this view a number of cells of a small Grove's battery were set up, having each an active zinc surface of twenty square inches and a platinum surface of eighteen square inches.

The lamp being placed in the situation usually occupied by the standard burner in a Sugg's photometer, the battery was, cell by cell, thrown into circuit.

When ten cells had been introduced the horseshoe showed a dull red, with fifteen cells a bright red, with thirty-four cells the light of one candle was given, with forty cells the light of 4¼ candles, and with forty-five cells the light of 9·20 candles, and with forty-eight cells 16 candles.

Having thus determined what amount of electric current would be required for experiments, arrangements were made to measure accurately the resistance of the horseshoe while in actual use and emitting different amounts of light. The resistance of this carbon thread at the ordinary temperature had been already determined as 123 ohms in the usual way, but it was presumed, as had been shown by Matthiessen (*Phil. Mag*,, xvi., 1858, pp. 220, 221), that this resistance would diminish with rise of temperature.

To measure the resistance under these circumstances the apparatus was arranged as follows:

The current from the battery was divided into two branches, which traversed, in opposite directions, the two differential galvanometers. One branch then traversed the lamp, while the other passed through a set of adjustable resistances composed of German-silver wires stretched in the free air of the laboratory, to avoid heating. (Careful tests of these resistances showed that no sensible heating occurred under these circumstances.)

Matters being thus arranged, the resistances were adjusted until the galvanometer showed no deflection when the candle power of the lamp was taken repeatedly in the photometer, and the amount of resistance was noted.

These measurements were several times repeated, shifting the coils of the galvanometer and reversing the direction of the current.

The results so obtained were as follows:

| Resistances. | Condition of Loop. |
|---|---|
| 123 ohms | Cold. |
| 94 " | Orange light. |
| 83·7 " | 0·9 candle, |
| 79·8 " | 5 " |
| 75 " | 18 " |

The photometric measurement was in all these cases taken with the carbon loop at right angles to the axis of the photometer, which was, of course, much in favor of the electric lamp. On turning the lamp round so as to bring the carbon parallel with the axis of the photometer, *i. e.*, the edge of the loop turned toward the photometer disc, the light was greatly diminished, so that it was reduced to almost one-third of what it was with the loop sideways to the photometer disc.

Having thus determined the resistance of the lamp when in actual use, it was next desirable to measure the quantity of the current flowing under the same conditions.

To do this the current from fifty cells of battery was passed through a tangent galvanometer as a mere check or indicator of variations, and then through a copper voltameter, *i. e.*, a jar, containing solution of cupric sulphates with copper electrodes immersed, and then through the lamp, placed in the photometer.

Under these conditions it was found that during an hour the light gradually varied from about 16 candles at the beginning to about 14 candles at the end, making an average of about 15 candles, measured with side of loop toward the disc.

The galvanometer during this time only showed a fall of a half degree in the deflection of the needle.

Carefully drying and weighing the copper electrodes, it was found that one had lost 1·0624 grammes.

Now, it is well known that a current of one weber takes up 0·00326 gramme of copper per second, which would make 1·1736 grammes in an hour; therefore the current in the present case must have been on an average 1·0624÷1·1736=0·905 webers, or a little less than one weber.

Having thus obtained the resistance of the lamp when emitting a light of 15 candles, namely, 76 ohms, and the amount of current passing under the same conditions, namely, 0·905 weber, we have all the experimental data required for the determination of the energy transformed or expended in the lamp, expressed in foot pounds. For this we multiply together the square of the current, the resistance, the constant, 0·737335 (which expresses the fraction of a foot pound involved in a current of one weber traversing a resistance of one ohm for one second), and the number of seconds in a minute. Thus, in the present case, we have 0·9 =0·8125, and 0·8125 × 76 × 0·737335 × 60=2753·76 foot pounds.

Dividing these foot pounds per minut , by the number of foot pounds per minute in a horse power, that is, 33,000, we have 0·08, that is, about eight one-hundredths or one-twelfth of a horse power as the energy expended in each lamp.

It would thus appear that with such lamps as this, one horse power of energy in the current would operate 12 lamps of the same resistence, with an average candle power of ten candles each,* or 120 candles in the aggregate.

Assuming that a Siemens or Brush machine were employed to generate the electric current, such a current would be obtained, as has been shown by numerous experiments, with a loss of about 40 per cent. of the mechanical energy applied to the driving pulley of the machine. To operate these 12 lamps, therefore, we should have to apply more than one horse power to the pulley of the machine, so that when this loss in transformation had been encountered, there should be one horse power of electric energy produced. This would call for 1¼ horse power applied to the pulley of the dynamo-electric machine, by the steam engine.

To produce one horse power in a steam engine of the best construction about three pounds of coal per hour must be burned, and therefore for 1¼ horse power 5 lbs. of coal must be burned.

On the other hand one pound of gas coal will produce 5 cubic feet of gas, and will leave, besides, a large part of its weight in coke, to say nothing of other "residuals," which will represent practically about the difference in value between "steam making" and "gas making coal," so that it will not be unfair to take five pounds of gas coal as the equivalent of five pounds of steam coal.

These five pounds of gas coal will then yield 25 cubic feet of gas, which, if burned in five gas burners of the best construction, will give from 20 to 22 candles each, or 100 to 110 candles in the aggregate.

We have, then, the twelve Edison lamps producing 120 candles, and the five gas burners producing 100 to 110 candles, with an equivalent expenditure of fuel.

If each apparatus and system could be worked with equal facility and economy, this would of course show *something* in favor of the electric light, but when in fact everything in this regard is against the electric light, which demands vastly more machinery, and that of a more delicate kind, requires more skillful management, shows more liability to disarrangement and waste, and presents an utter lack of the storage capacity which secures such a vast efficiency, convenience, and economy in gas, then we see that this relatively trifling economy disappears or ceases to have any controlling importance in the practical relations of the subject.—*Scientific American.*

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Consolidation in Baltimore.—It is understood that the old Baltimore Company, the Peoples Company, and the Consumers Company have nearly completed arrangements for a consolidation into one establishment. The details of the arrangement are not yet made public; but it is gratifying to know that wisdom is prevailing in the councils of those managing the gas business in Baltimore.

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* The candle power being 15 candles in the best position, and 5 candles at right angles to this, the average or general illuminating power of the lamp is 10 candles.

[Official Report.—Continued from page 154.]

## Tenth Annual Meeting of the New England Association of Gas Engineers.

Held at Boston, Feb. 18th, 1880.

[Concluded.]

Mr. Stiness—I was at the Corliss Engine Works about three weeks ago, and in conversation with Mr. Corliss he claimed that with the very best results they have never been able to get below 2¼ pounds of coal per horse power per hour. In addition to that, I think Col. Armington remembers that when we visited the Conant Thread Works, they stated that for a year's work with a 1000-horse power engine their result was 2¼ pounds of coal per horse power per hour. Mr. Corliss questioned that any engine could run with less than 2¼ pounds of coal per horse power per hour, and you put your figures at 2 pounds.

Mr. Vanderpool—I would say that I do not know of any engine that does that work right along. With the engine in first-class condition, and with new boilers, and all the conditions favorable, these figures may perhaps be reached for a limited time; but I doubt very much whether any engine, working year in and year out, can do it.

Mr. Stiness—The results at the Conant Thread Works were 2¼ pounds of coal per horse power per hour for a year's work, and Mr. Corliss questions whether it can be done with less than 2¼ pounds. Of course, that makes your figures so much better.

Mr. Vanderpool—A very great advance in the utilization of power may come from the better utilization of fuel under the boiler. There has been a great improvement in boilers in the last year or two, so that there is a great saving in boilers' fuel by gas furnaces. They are bringing it down so that instead of getting an evaporation of 7 or 8 pounds per pound of coal, they get 10 or 11, which will make a great difference in the power.

Mr. Scott—I have here the result of some experiments with a Corliss compound pumping engine. We made four experiments. The result was 1.88 pounds of coal the first day, 1.78 the second, 1.68 the third, and 1.66 the fourth. I would state that Mr. Corliss has a contract for one of his engines guaranteed to run at from two to four pounds per horse power per hour.

Mr. Goodwin—There is one other remark that I would like to make, and that is in relation to the variation in the quality of coal gas—that is to say, in illuminating and heating power—examples of which I have here. For instance, gas of 26 candles, for illuminating purposes, is 75 per cent. better than ordinary 15-candle gas. Experiments show, however, that for heating purposes it is but 23 per cent. better.

Mr. Vanderpool—Upon that point I would say that that comes in the weight. That is taken by weight, not by volume. Taken by volume, it would be 2 to 1. That is, supposing the specific gravity to be 800, it would give about 1200 heat units per cubic foot; whereas 16 candles would give about 660, and 12 candles would give about 634, both by calculation and experiment. It makes a difference which way you take it. We do not sell gas by specific gravity, but by the cubic foot.

Mr. Goodwin—I merely wanted to put it into candle power; 33-candle gas is 120 per cent. better than 15-candle gas for illuminating purposes, but only 50 per cent. better for heating purposes.

I would like to make one other remark, in reference to a little incident that happened in reference to gas cooking stoves. Two ladies called at our office some time ago, and wanted to know if we had any gas stoves. They wanted to use one in a school for cooking that they were about to start in Philadelphia. They said, "We are from Boston, and we have ordered a range from there [I don't remember the name of it, but it was a very elegant looking one] that beats anything in the world." I said, "Ladies, I propose to beat your Boston range."

"You can't beat anything that comes from Boston."

"Will you give me an opportunity to try?"

"Certainly, sir."

I had a No. 9 stove put up, and I didn't go near it until one day a certain gentleman called, the forepart of whose name is "Major," and who conducts a gas light journal; but it wont do to call any names here. He called at my office, and I went with him and introduced him to these Boston ladies, and asked them to say anything they could against that stove; and I appeal to the Major if they did not say, "Mr. Goodwin, there is a loaf of bread cooked in that stove, and any man or woman who wants to eat a better loaf of bread than that don't deserve to have any"—or words to that effect. I did not go near them again until the other day I took a gentleman there and asked them to say the worst they could against the stove, and their reply was, "We could not get along without it; we cannot say a word against it."

Mr. Thomas—The matter of the introduction of gas stoves as a means of increasing the consumption of gas, has been worked up pretty carefully in the city of Brooklyn by a course of lectures given there by a lady who may have been imported by Mr. Goodwin; but I don't say she was. (Laughter.) The stove that was used during the lecture was, at any rate, Mr. Goodwin's, and was a No. 9 stove. There was not a good opportunity for getting gas there without bringing it down from the side lights; but we cut a hole in the floor and made a connection under the floor with an ordinary ¾-pipe. When the lady first came in the room I noticed the stove was lighted, but after heating some water and showing how quickly it could be done, the gas was turned off for a short time. There was some considerable description of the stove before she commenced her lessons on cookery, showing how the gas was turned on and off, and how the stove was operated. Then she commenced making different things and cooking them on the stove. She cooked some three or four different dishes and handed them to the audience to let them see how they liked them. The lecture occupied about an hour. After she was through the stove was kept lighted for, I suppose, half an hour longer, and the consumption for the entire time, as near as we could fix it on the meter, was about 100 feet.

Now I think it is a great mistake (and I found it so myself) to attach an ordinary gas stove used by a family to one of the side burners. I had a little one in my house, and I just ran a ¾-pipe from the cellar and brought it up to the gas stove, and I never had a particle of trouble. In fact it was such a pleasure to my wife to use it that I was afraid I would be cooked out. (Laughter.) As far as the things that were cooked on it were concerned, especially meats, as Mr. Goodwin says, if a man has never eaten a steak cooked on a gas stove he don't know what good steak is. The loss in cooking is brought down as low as 10 per cent., I think. I am confident the loss will not, in any event, exceed 12 per cent., while the loss on articles cooked over a fire is at least 30 per cent.

These stoves are very readily managed, and are very economical. All you have to do when you want heat is to turn the gas on, and you have it. When I first introduced the stove at my home, I found that my wife had too many burners on it, and it made the oven too hot; but since that time we have had no trouble whatever. It is a stove that I got a number of years ago. I was on one occasion invited to a dinner where all the preparations were made with that stove. The party consisted of eighteen persons, and the cost of cooking was 25 cents. You can do the ordinary family cooking for at least 15 or 16 cents. The ladies were perfectly delighted with this stove and its operation, and a great many inquiries are made of my wife every day; and I have no doubt but that there will be a large trade in gas stoves in the future.

Mr. Neal—Has your stove a funnel leading into the chimney?

Mr. Thomas—No, sir; it just sets out in the laundry.

Mr. Neal—Has it a water-back?

Mr. Thomas—It has a water-side on one end.

Mr. Neal—Can you heat water for bathing purposes?

Mr. Thomas—No, it does not heat enough water for that. It heats enough for cooking purposes, but not for bathing purposes.

The President—We have disposed of our order of business, and it is now for the Association to determine whether the present session shall be longer continued.

Mr. Neal—There is no other business upon the Secretary's table.

Mr. Harbison—Before we adjourn I would like to ask if there is any gentlemen present who will state what their experience has been in the use of enrichers in place of cannel? The impression is that everybody knows all about it; but I am so unfortunate as to know very little about it.

The President—That would open a large field for discussion, and the time for adjournment is very near.

Mr. Neal—I would state that there are several of the members who are anxious to get away, and to try the sense of the meeting I move that we adjourn *sine die* at a quarter past twelve to-day.

Carried.

The President—Before we adjourn I would again urge on the members of the Association the desirability of bringing to our next meeting as exact statements as possible. Keep them in some portable shape, put them in your pockets and bring them along. Our friend Mr. Cabot has set us an example in this respect which I hope we will all follow. When we refer to our experiments, it is certainly much more satisfactory, both to ourselves and the Association, to be able to give exact information, than it is merely to make a general statement from memory. Such a statement does not carry with it the weight that a direct reference to our figures does. I hope you will all try, in your experiments this year, to keep an exact record of the results, and give us those exact records, and not a statement from general recollection; and I think we shall all be pleased with the enhanced interest that such a course, if adopted, will give to our meetings in the future. (Applause.)

Mr. Wood—There is one little matter that has occurred to me that I would like to speak of before we separate, which perhaps may be of some

advantage to others—and that is in regard to clinkering the fires. We find that our business starts from the retort house, and that that is where the profit, if there is any, is to be made. It has been our custom, and that of other gas companies also, I believe, to have the gangs shift at 6 o'clock night and morning, and to clinker the fires the first thing when they come on. In consequence, as a general thing, the meter indicates a loss. I have changed the programme in our works, and have the men clinker the fires before leaving. They clinker the fires that they have been keeping through the day. It makes them very careful; they clinker them about 4 o'clock in the afternoon, and again at 4 o'clock the next morning, and when I come to the office at 9 o'clock, I do not find that there is any depreciation in the make. We get as much in the first three hours as we do in the other three. I cannot discover that there is any change.

The following telegram was received from the Central New York Association:

"ROCHESTER, N. Y., February, 19, 1880."

"S. G. STINESS, Pres. New England Gas Engineers' Association, Young's Hotel, Boston:—

"The Central New York Association, in solemn conclave, shout greetings on your tenth birthday. May they strike pleasantly on the tin-pan-um of your anniversary ear. CLEMENT A. WHITE, Secretary."

The Association then adjourned *sine die*.

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[From the "London Journal of Gas Lighting."

## South-West of England District Association of Gas Managers.

The fifth half-yearly meeting of this Association was held at Taunton, on Tuesday, March 9, Mr. S. W. Durkin (Southampton), the President, in the chair.

The Honorary Secretary (Mr. T. W. R. White, of Sherborne), read the minutes of the previous meeting, which were confirmed.

Four new members were then elected; after which

The President delivered the following

### INAUGURAL ADDRESS.

Gentlemen,—I have to thank you for the honor that you have conferred upon the town of Southampton in electing me to fill the office of President of this Association, more especially when I consider that other places of importance, and better representing our special industry, might have been selected from, to furnish some one to preside over your deliberations. I am proud to represent my native town, although we cannot boast of vast industries, or ancient fame, or of being a pleasant watering place, where the weary may drink in sea breezes, or an inland health-resort, where the weak may resort for relief; yet we are a busy, growing town, and useful as a mail packet station and for general commerce, and it will afford me pleasure to welcome this Association there when they elect to come.

Passing from these opening remarks, allow me to say, without any disparagement to the parent Association, that we are met together to get at each other in a friendly way, for the exchange of ideas that may be helpful in discharging the duties which come to every one of us, and to lift each other up above surrounding circumstances, which sometimes tend to pull us down to them. We therefore should always be willing to obtain knowledge that will help us master our duties.

The success of a gas company depends much upon the manager's assiduity. The dividend is not earned in the board-room, however well that very necessary department may be managed; but, in the first instance, at the works, and to effect that object the chief product there made should be safely conducted through the consumers meters.

At the meter our control ceases, and other perplexities arise, and, as I showed a short time since, in my paper on "Bad Gas-fittings, with Practical Illustrations," not of our own making or seeking. Some reform in this respect may eventually come, but it is a long time coming.

I am sure you will not expect me to take up your time in dilating too much on any one topic, as the process of gas manufacture, in its various stages, opens up matter for discussion, and I have no doubt the ability possessed by our various members will enable them to bring up from time to time papers that will elucidate some of its mysteries.

In the carbonizing of coal many attempts, as you know, have been made to introduce machinery for the charging and drawing of retorts. Some of these appliances have fallen to the rear, others are making headway. Being in a neighboring town a few weeks since, I had an opportunity of witnessing the performance of Mr. West's apparatus. There everything in the retort-houses was being adapted to the proper working of the system, and when this has been accomplished, I am told that with four-hour charges 11,000 cubic feet of gas per ton of coal will be easily obtained. It resolves itself into the cost of producing—labor, and repairs, etc.,—and the plan that will do its work best and cheapest is the one that will succeed. Mr. Warner, of South Shields, has also been working in this direction, and with apparent success.

In heating retorts, some question has been started as to whether we are using the best and most economical method.

The venerable hydraulic main, too, is beginning to shake on its crutches, and anti-dips are as plentiful as blackberries in autumn.

A great diversity of opinion exists as to the influence of condensation on gas. Whether to remove the tar direct from the hydraulic main, or to continue the contact for a longer period than we do now, is a question, and, as far as I can judge, it is one of gradually reducing the temperature, which, in a variable climate like ours, and with apparatus exposed to all climatic variations, becomes somewhat difficult. Perhaps some one of our members may take up this question on a future occasion.

Some time since it became the fashion to erect large scrubbers for the elimination of ammonia, and no doubt these will continue to be used; but now the old washing vessel is to the front again as an auxilliary, with, of course, great improvements in detail. Whereas formerly the gas went in with a rush, it is now broken up into small streams. The object of this is obvious to all. Then there is the hybrid scrubber, with the revolving discs which does good work and occupies little space.

The final stage of gas purification in our cities and large towns is the question of the day for us, owing to legal enactments. The demand for purer gas, whether a righteous cry or not, has to be met, and during the past few years great strides in advance have been made; but from all I can gather, the process mostly adopted is not always successful in its results. There are still some missing links, which further experience will perhaps forge on, and so complete the chain of the process. Whether that process will be the use of lime and oxide in open vessels, or whether the "wet nursing" will obtain, time alone will show.

Gas managers have been taunted with being behind the times; but with multifarious duties on their hands, there is not much time left for erudite studies. If the public taunt us, we can return the compliment by stating that they are certainly behind in the way they use, or rather waste the gas. Notwithstanding, I have no doubt improvements will go on from retort-house to improved methods of consumption, and the purer and more cheaply gas can be made and supplied, so will the intenser lights be kept at a respectful distance. The electric light will, no doubt, be used for some purposes, but it is not capable of being stored for use at all hours of the day and night, like gas; and therefore you can only obtain a supply when the motor is working.

We have yet a wide supplementary field for the use of gas for cooking, heating and driving purposes; and here I would pay a passing tribute to my late friend and predecessor, Mr. James Sharp, who did good work in his day in lecturing on gas cooking from nearly one end of the kingdom to the other. He sowed the seed from which manufacturers of gas cooking apparatus, and gas companies also are reaping a goodly harvest. As an example of what may be done, I have had fixed during the past winter some 50 gas fires for warming different apartments at our consumers residences, and this arose partly from my medical man seeing one in operation at my residence. and having one fixed for his own use, and recommending them to others. Amongst heating stoves, Dr. Bond, formerly Curator of the Hartley Institute, Southampton, but now of Gloucester, has brought out the Euthermic heating and ventilating gas stove, which has some very good points about it.

Gas engines are worth attention, as they can be utilized for various purposes, one of which, by the kindness of our ex-President, we saw in use for driving the air pumps to fill the bellows of the splendid organ in Salisbury Cathedral.

The letting out of gas-cookers on hire is becoming more general, and if gas directors would offer some inducement to managers to participate in the prosperity of their companies, much more in this way might be done. Our friend Mr. Hardick is to give us some of his experience of the hiring-out system.

The insurance of gas works is obtaining a place in our economy, and one large company I know of have just arranged a policy of insurance. Some persons, perhaps, may say that it is not necessary, as we have good reserve-funds; but others may not be in that happy position. If an insurance is effected, you then have the advantage, in the event of accident, of not disturbing the nest-egg, which will be some day required for its legitimate purpose.

Another question has been just brought to the front in the *Journal of Gas Lighting*—viz., the abolition of meter rents. You may say it will increase the cost of gas. Yes, to a certain extent, it will; but on the gas demand note it will disappear, and save a quantity of unnecessary work. It will facillitate control over meters, and the whole obligation of keeping them in repair will rest on the companies; whereas, if a consumer is the owner, and the meter gets out of order, he will occasionally tell you he is an old con-

sumer, and the company ought to put it right. Some say a reduction in the price of gas would be better, as every one can understand this, and the rent of the meter is not noticed. There is some truth in that, but with not a few consumers the meter rent is a grievance, and the less number of these the better. I rather lean to the side of abolishing meter rents.

I have not touched on the subject of street lighting. Sufficient has been shown in various towns of what can be done in this respect by the improvements of our friend Mr. Sugg, and others not so well known to fame; but the lighting authorities, out of consideration for the pockts of the poor ratepayers, seem to "love darkness rather than light."

In concluding, allow me to say that I might have touched on other matters of interest, but felt it was part of my duty not to take up too much of your time, and I beg to thank you for listening so patiently to what is but the traversing of a somewhat beaten track.

On the motion of Mr. Cockey (Frome), a vote of thanks was passed to the President for his address.

The reading of papers was then proceeded with, these being taken in the order in which they here appear.

Mr. A. Edwards (Taunton) read the following paper:

### NOTES ON CARBONIZING.

You are all doubtless well aware of the points to be observed in selecting coal—such as size, quality, and purity of gas and quantity of coke, relative price, etc., etc. I will not, therefore, occupy your time by entering into details relative thereto, but may remark in passing that it does not always happen that the coal which is alleged to produce the largest quantity and best quality of gas per ton proves the most economical in working, especially if a chemical analysis only is the voucher for these particulars. The writer prefers a working analysis, made in the ordinary course of manufacture on his own works, from a sample of from 10 to 20 tons, as a coal which may prove most useful in one works may, from various causes, be much less useful in another.

As to the coal when purchased, it is desirable to note that by mixing with a rich heavy coal, which takes very high heats, and a long time to give up its gas, some other coal, which, with lower heats, gives off its gas quickly, results often above the average production per mouthpiece, and percentage of coke used as fuel, are obtained. The proportion of each coal might, of course, be raised from time to time, according to the result desired.

The writer strongly recommends the weighing of all coal delivered to stokers, and the periodical calculation and comparison of the results obtained under the following heads:

Quantity of gas obtained per ton.
Average illuminating power.
Cost of coal for each 1000 feet of gas produced.

The writer's experience of the leading varities of coals, as regards the quantity and quality of gas resulting, may be set down as follows:

Real Old Silkstone Coal (Screened Nuts)—10,500 to 10,600 cubic feet of 17-candle gas. Impurities low.

Best Derbyshire Silkstone.—9800 cubic feet of 17½-candle gas, to 10,200 cubic feet of 16-candle gas. Impurities low, except $CO_2$.

Gloucestershire Coal (large).—9500 cubic feet of 17½-candle gas, to 10,000 cubic feet of 16-candle gas. Ditto, through. 8500 cubic feet of 16½-candle gas to 9000 cubic feet of 16-candle gas. Impurities over the average.

Best Gewcastle Coal (Pelaw Main or New Pelton).—10,000 cubic feet of 17-candle gas. Impurities low.

Real Llantwit Coals.—9500 cubic feet of 18-candle gas, to 10,500 cubic feet of 14½-candle gas. Impurities high.

Wigan Nuts.—10,000 cubic feet of 15-candle gas, to 10,750 cubic feet of 14-candle gas.

Abersychan Seams.—9500 cubic feet of 15½-candle gas, to 10,600 cubic feet of 13½-candle gas. Impurities high.

As to materials for settings, after several trials of other kinds of materials, the writer is of opinion that the best Stourbridge retorts and other fire-clay goods are superior for use in gas works to any others at present procurable. Fire-clay materials alone should form the mass of a retort stack, the extra first cost being compensated by the greater durability of the work.

The furnace need not be of any fixed design, but may profitably be varied, both as to size and shape, according to the quality of coke available as fuel and the amount of work required of it. Large furnaces and good coke being necessary to carbonize rich coals, while smaller furnaces will suffice to carbonize the poorer coals.

As regards the vexed question of much or little brickwork in retort settings, the writer would venture to suggest the happy medium. For all arches, pillars, etc., employing a dimension of 9 inches; where exposed to the direct action of the furnace gases, but not covering a retort at any part for more than six inches, measured across the direction of the stay, and in the flues away from the furnace, not more than three or four inches. Unless the furnace gases are deflected in some way on to the surface of the retort, no shield or other protection is necessary if the retort be properly charged in working.

Retorts keep their shape and work better when the supports over the furnace are placed not more than 14 inches apart, as compared with fewer supports. The writer would be glad to find some which need less support, but has failed hitherto.

Ample space should be given in the flues of retort settings, provision made for cleaning them regularly, and this cleaning strenuously enforced. Chimneys and main flues should be of large capacity, having over rather than under one foot area per furnace served; proper dampers being provided and used for regulating the draught. Careful attention should be given to the stopping of leaks in retorts immediately they appear.

The ascension and dip pipes should never be less than four inches in diameter, and if above this size should have a diameter of one inch for each cwt. of coal charged per mouthpiece per 12 hours. The seal in small works need not exceed one inch, if the back pressure caused by the purifiers, gasholder, etc., is reasonable.

In common with several other members of this Association, the writer has tried the experiment of dispensing with the dip in the hydraulic main. His experience hitherto does not induce him to recommend the system. It is, however, possible that he has not yet tried the best apparatus for the purpose.

It is obvious that with the best appliances and materials good results cannot be obtained without the co-operation of the men employed as stokers. Considerable advantage obtains from giving them a money interest in the results of carbonizing. The system adopted at the writer's works consists of setting a task, varying from 17,000 to 21,000 cubic feet per man employed per shift, according to the number of retors in action, the quality of the coal, etc., etc., and a payment of 3d. per 1000 cubic feet is made for all gas produced over and above the stipulated quantity, care being taken to prevent such extra quantity being unfairly produced or registered. This precaution is the more important as under this system unusual temptation arises to put in lighter charges during the later hours of the shift, whereby the illuminating power of the gas is depreciated, in consequence of the coal being over burned. The taking of the indication of the station meter at the termination of each shift, and also three hours later, is sufficient to determine whether the gas is fairly made.

The quality of the coke produced from the coal carbonized should be carefully noted. Unless a sufficient portion of the coal produces a hard, strong clean coke, capable of standing the draught of the furnace, and producing intense heat, the labor both of manager and stoker may well be spared, for excellent carbonizing results are unlikely to be obtained. This hard coke is not, however, the most suitable for domestic use, the draught of most house grates not being strong enough to keep it alight. It is for this reason often advisable to use a percentage of coal producing a more tender coke, taking the precaution not to stack such coke to any great height, or for a long period of time.

Finally, the writer is far from supposing that the few remarks he has been able to put together at short notice embody all that might be said upon this important subject, or are in themselves of sufficient value to deserve the attention given them; and he trusts the members present will, in the discussion to follow, supply from their varied experience the many defects and deficiences of this communication, and thus bring about a result which may be worthy of the South-West of England District Association of Gas Managers.

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Mr. T. Hardick (Salisbury) read a paper headed—

### REMARKS ON THE ADVANTAGES OF LETTING GAS COOKERS ON HIRE.

He said: I should feel very diffident in speaking of what we are doing, did I not know that some of my esteemed brethren whose works are even smaller than those at Salisbury, may be encouraged in their efforts to promote the best interests of the companies they represent.

In the year 1872, I was looking through my carbonizing book, when I was struck with the very small quantity of gas used during the day, and taking the exact quantity for three promiscuous days in June, two in July and two in August, I found that from 6 a.m. to 6 p.m. we used on the several days 3000, 3000, 6000, 5000, 7000, 5100, and 7000 cubic feet, or a total of 36,000 cubic feet in the seven days. I resolved, therefore, to bring the subject before my Directors, in my next monthly report, and this I did in the following manner:

"I have considered the desirability of the Company letting out cooking-stoves, on conditions and terms somewhat resembling those of meters, and have every reason to believe that it would answer the Company's purpose. The wear and tear of the stoves was a matter I could not quite make up my

mind upon. I therefore procured an estimate from Messrs. Davis and Son, of Bath, who would undertake to keep their stoves in repair for five years at the rate of five per cent. per annum on the cost price. The risk, therefore, would be but small, as no large stock would be required, stoves being ordered from time to time according to the demand.

My Directors at once approved of the plan, and the Chairman, being in the medical profession, rendered great service in introducing and recommending it, very soon procuring for me an opportunity of testing its value in cooking at the Infirmary. This we did most efficiently for 112 inmates, with two of Messrs. Davis and Son's stoves, a No. 3 and a No. 4 burner, and no fire was lighted for cooking in any manner for some time. Soon afterwards, when the Institution was greatly enlarged, Messrs. Davis and Son were employed to erect a large and suitable cooking apparatus.

In letting, I confined myself entirely to Messrs. Davis and Son's stoves, as I found them most satisfactory in every respect, easily fixed, inexpensive in repairs, and economical in the quantity of gas required. Another reason which induced me to persevere in the use of the same stoves was that it prevented any fruitless comparison between the stoves of the different makers, which might involve a frequent change according to the fancy of the many cooks. I am, however, not, prejudiced against any other maker, and am always ready to procure stoves made by other firms, provided the parties purchase them, and in no case do I make a profit on such business, my object being simply to sell gas.

From the first I had settled determinedly that no rent or income from the stoves should go to swell the revenue account until the whole outlay had been recouped, being satisfied with the profits accruing on the sale of gas.

The following figures will show the disbursement for stoves and repairs up to Christmas last, and the amount received from the sale of stoves, and for rent:

| Year. | Month. | Stoves sold. | Rent Received. | Outlay for Stoves and Repairs. |
|---|---|---|---|---|
| 1873 | | | | |
| 1874 | June..... | £28 16 0 | £26 0 0 | £271 11 11 |
| 1875 | " ..... | 27 9 3 | 32 6 3 | 93 19 0 |
| 1876 | " ..... | 36 12 6 | 35 15 9 | 40 16 9 |
| 1877 | " ..... | 20 19 0 | 38 4 7 | 20 4 8 |
| 1878 | " ..... | 10 11 0 | 36 8 4 | 20 13 3 |
| 1879 | " ..... | 1 10 3 | 31 5 3 | 9 4 8 |
| 1879 | Christmas..... | 2 12 6 | 12 6 6 | — |
| | | £128 11 3 | £212 6 8 | £456 10 3 |
| | Less amount received for stoves sold and rent..... | | | £340 17 11 |
| | Total ..... | | | £115 12 4 |

A short time will now suffice for writing off the whole of the cost and repairs of the stoves, when any surplus rent may be applied for other purposes.

I have already mentioned that my day aggregate consumption in 1873, for seven days taken promiscuously in the months of June, July and August, was 36,000 feet; in 1874, for corresponding time and dates, it was 68,000; in 1875 it was 111,000; in 1878, 197,000; and in 1879, 208,000. The following amounts represent the last item, 36,300, 32,000, 31,000, 29,000, 23,000, 32,000, 25,000. Some days, however, the consumption has reached 41,000 feet, and even more. A short time ago I made some extracts from my book, and furnished one or two friends with them; but as I have not a copy to refer to I cannot say if the results are more or less favorable. One thing is certain—I have carefully refrained from exaggeration. I have gone through my summer rental for the past two years, and find that the increased consumption of about fifty houses, where cooking by gas is practised, is something like 1,100,000 or 1,200,000 cubic feet. Of course, this does not include numbers of small families where the increase may be but a few thousands each. My consumption in the summer half year, before I made my report, was 6,673,700 cubic feet; last year it was 13,231,200 feet. I believe one-third of my summer make is consumed in the daytime, and a great many people become so accustomed to cooking by gas that they continue to do so all the year round. For cooking we increase the pressure to four-tenths, from 10:30 a.m. to 2:30 p.m., which will be seen by referring to one of our pressure papers.

I look forward to much being done, not only for cooking, but for heating, etc. We have also two motive-power engines, each using about 150,000 cubic feet a year, besides many smaller ones.

Our charge for the use of stoves is according to the following scale—

| | | |
|---|---|---|
| No. 1 burner..... | 5s. 0d. | per year. |
| No. 2 " ..... | 7s. 6d. | " |
| No. 3 " ..... | 10s. 0d. | " |
| No. 4 " ..... | 13s. 0d. | " |

In 1877 we had in use for hire—4 No. 1, 27 No. 2, 43 No. 3, and 15 No. 4 stoves. These numbers are, of course, ever varying.

Mr. G. Garnett (Ryde) had prepared the following paper, which, in his absence, was read by the Honorary Secretary—

ON THE PROPOSED USE OF COAL GAS FOR RAISING STEAM FOR LOCOMOTIVE PASSENGER TRAINS ON HYDE PIER RAILWAY.

The joint London and South Western, and London, Brighton, and South Coast Railway Companies, having completed their new line of railway from Hyde Pier to the Ryde Station of the Isle of Wight Railway, by tunnelling under the town, and having thereby thrown out of use the ordinary horse tram cars, the Pier Company have determined to work their pier railway passenger traffic by steam tram-cars, and, in order to avoid nuisance to the promenade pier, to raise the steam by means of coal gas. It is thought that the novelty of the work now in course of execution may prove interesting to the members of the South West of England District Association of Gas Managers.

The car to be used as a locomotive is one of the ordinary passenger cars, a portion of the floor of which will be removed where the engines and boilers are fixed. A wrought-iron under-frame is to be constructed, with horn plates, axle boxes, and spring arrangement, suited for inside bearings, and new steel wheels 2 ft. 6 in. in diameter are to be provided. Besides the two carrying axles, there will be between them, in the centre, a driving axle or ordinary shaft, as in Crampton's patent locomotive, with no wheels on it. The three axles will have cranks on the outer ends for coupling, like a six-wheel coupled locomotive. This arrangement dismisses gearing from the design, and admits of the free action of the springs without affecting the machinery.

The central shaft will be driven by two vertical steam engines, each having cylinders 5 inches in diameter and 15 inches stroke. These unusual proportions are adopted for the following reasons—first, to acquire the power by a light engine with light reciprocating parts moving slowly and avoiding vibration and rattle; secondly, to be economical in width of space occupied, that being limited; thirdly, to expand the steam effectively by cutting off early and exhausting late, and to have as little pressure and heat as possible in the exhaust, so that it may be easily suppressed in the condenser and issue as nearly as possibly noiselessly and invisibly.

The engines will have link-motion reversing gear, operated from either of the end platforms, and the brake will also be made available at either end. The boiler will be vertical multitubular, so constructed as to utilize the heat to the greatest advantage. It will carry a steam pressure of 120 lbs., with a loaded margin up to 160 lbs., to avoid blowing off steam. It will be made of the best material, the shell plates being of best Staffordshire iron, the furnace and tube plates of Lowmoor iron. It will be fed by two injectors from light tanks fitted between the new under frames which will receive the condensed exhaust water, and be replenished occasionally by a hose at the terminus.

The furnace will be constructed to burn gas and air on the Bunsen principle, and the gas will be supplied from four rectangular gas bags similar to those used for carriage lighting on the Lancashire and Yorkshire Railway. These bags will each contain about 100 cubic feet of gas, and will be placed in the four inside corners of the car, which will itself have no passenger space except for the driver. These gas bags will be filled from a station gasholder of 1000 cubic feet capacity, at a sufficient pressure to expand the bags and deliver all through one main-pipe in the centre of the car, fitted at each end with unions for receiving gas at the terminus. The gasholder will be provided with a crab for raising and lowering the counterpoise weights as occasion may require, to fill from the street main at day pressure (7-10ths), and fill the bags at 1·5 inches pressure. When standing for any length of time at the terminus, the gas for getting up or keeping up steam may be taken direct from the main, but when running the furnace would take its supply from the store in the four bags, any one of which alone, in case of failure to the others, would be enough to run a car a few trips.

On the top of the car will be a long rectangular tank with numerous small tubes running transversely through it, and fitted on each side with louvre boards to direct the current of air through the tubes as the car travels, and the exhaust steam being injected into this tank, and made to travel the length of it two or three times, passing all the tubes, it will be condensed, suppressed, and recovered to the fullest possible extent for feed water.

The funnel will be central, neat in appearance, and no smoke or vapor will visibly issue from it.

It is calculated that the car will travel from eight to ten miles an hour, alone, and, if needed, will draw six other cars, of ordinary size and weight, on a level at from six to eight miles an hour in fair weather, but will at any time draw four other cars at a good speed.

The length of the railway being a few yards short of half a mile, there is probably no reason to doubt the practicability of the application of gas as fuel, provided it is consumed at a sufficient pressure to prevent the burners from lighting back during the vibration of transit. The detail of the burners, however, is not yet determined on, the experimental trials not being concluded.

[From the London "Journal of Gas Lighting."]

## Scheme for the Amalgamation of the South Metropolitan Gas Company with the Phœnix Gas Light and Coke Company,

UNDER THE POWERS AND PROVISIONS OF THE SOUTH METROPOLITAN GAS LIGHT AND COKE COMPANY'S ACT, 1876, AND THE ACTS INCORPORATED THEREWITH. (CONFIRMED BY ORDER OF HER MAJESTY IN COUNCIL, MARCH 18, 1880.)

*Commencement of Operation of Scheme.*

1. This scheme shall come into operation on the first day of January, one thousand eight hundred and eighty, and all the provisions therein shall take effect on and from that date.

*Amalgamated Company to be called South Metropolitan Gas Company.*

2. The two companies—that is to say, the South Metropolitan Gas Company and the Phœnix Gas Light and Coke Company, hereinafter respectively styled South Metropolitan Company and the Phœnix Company—shall, except for the purpose of declaring a dividend for the half year immediately preceding the amalgamation, cease to exist as separate companies, and the undertakings of the two companies shall be united and form one undertaking, under the name and title of the South Metropolitan Gas Company, and by that name shall be one body corporate, with perpetual succession and a common seal.

*Works and Properties of the two Companies vested in United Company.*

3. All the lands, estates, property, plant, and effects, including all the gas works, buildings, mains, pipes, meters, fittings, and conveniences connected therewith, and also all the moneys, books, rents, rates, claims, and demands whatsoever of or belonging to either of the said two companies, shall be vested in the United Company to the same extent and for the same estate and interest as they were vested in either of the said two companies separately.

*All Rates Payable to the United Company.*

4. All rates, rents, and charges owing to either of the two companies shall be payable to the United Company, and shall be recoverable by such Company by the same ways and means, and subject to the same conditions, as they would have been recoverable by either of the two companies respectively but for this amalgamation.

*Debts, etc., of the two Companies to be Debts of the United Company.*

5. All debts, moneys, dividends, claims, and liabilities of every description, due by or recoverable from either of the two companies, shall in like manner be due by and recoverable from the United Company, and all checks for such or any other purposes shall be signed by two of the directors of the United Company, and countersigned by the Secretary.

*Contracts, Agreements, etc., preserved by the United Company.*

6. All debts and liabilities of every description, and all purchases and agreements for purchases, contracts, sales, conveyances, and securities incurred or entered into by either of the two companies before the amalgamation, shall be as valid and effectual to all intents and purposes for and against the United Company as if the same had been incurred by and entered into with the United Company instead of with either of the two companies.

*Actions or Parliamentary Proceedings not to Abate.*

7. Nothing in this scheme shall prevent any action, suit, or other proceedings promoted by or against either of the two companies, either separately or jointly, commenced before and pending on the said 1st day of January, whether in Parliament or at law or in equity, being continued, prosecuted, or enforced by or against the United Company, or by or against either of the two companies, as the case may require.

*Books to be Evidence.*

8. All books, accounts, and documents which would have been evidence in respect of any matter for or against either of the two companies, shall be admitted as evidence in respect of the same or the like matter for or against United Company.

*Accounts of the two Companies to be made out separately up to December 31, 1879.*

9. The two companies shall make up their accounts to the 31st of December in the usual form and mode, and such accounts, when approved of and certified by the respective auditors, shall be taken as correct, and all dividends, debts, claims, and liabilities shown therein as due from either company shall forthwith be paid and satisfied by the United Company, and the balances remaining after all liabilities have been discharged, shall, subject to the provisions of the South Metropolitan Company's Act, 1876, be dealt with as the directors see fit.

*Application of the Reserve Fund.*

10. The reserve fund of the Phœnix Company shall be added to the reserve fund of the South Metropolitan Company, and form the reserve fund of the United Company.

*Registers of Amalgamating Companies to Subsist until Replaced.*

11. All registers of shares, mortgages, bonds, and debenture stock of either of the two companies, and all registers of transfers thereof respectively, and all shareholder's address books, and all certificates of shares or stock of and in either of the two companies which are valid and subsisting, and shall have the same operation and effect after as before such commencement, until new or altered registers, books, and certificates respectively are substituted in their stead in pursuance of this scheme.

*Resolutions, etc., Continued.*

12. All resolutions, orders, and proceedings of general meetings and Boards of Directors, which at the time of this amalgamation are binding on either of the two companies, or their respective shareholders, directors, officers, or servants, or any of them, shall, so far as they are applicable, continue in full force and be binding on the United Company, and their shareholders, directors, and servants accordingly, until the same be varied, altered, or repealed by order of a general meeting or a Board of Directors of the United Company, as the case may require.

*General Saving of Rights and Claims.*

13. Everything done, suffered, and confirmed by or relating to either of the two companies before the commencement of this scheme, shall be as valid as if this scheme had not been confirmed, and the commencement of this scheme shall, except only as in this scheme otherwise expressly provided, be subject without prejudice to everything so done, suffered and confirmed respectively, and to all rights, liabilities, claims, and demands, and all parliamentary proceedings, both present and future, which would be incident to, and consequent on, any and every thing so done, suffered, and confirmed respectively; and with respect to all such things so done, suffered, and confirmed respectively, and to all such rights, liabilities, claims, and demands, the United Company shall to all intents and purposes represent both of the amalgamating companies.

CONSTITUTION AND REGULATION OF UNITED COMPANY.

*Provisions of Existing Acts Continued.*

14. The acts relating to or affecting the South Metropolitan Company and the Phœnix Company in force at the date of the commencement of this scheme shall, except so far as the same are varied by or inconsistent with this scheme, remain in full force; and all rights and powers of such Acts, or any of them, conferred on and vested in either of the two companies in relation to the undertaking of such company, may be enjoyed and exercised by the United Company; provided, that in the event of the provisions of any act of the Phœnex Company being inconsistent with those of any act or scheme of amalgamation of the South Metropolitan Company, the provisions of the acts and schemes of amalgamation of the last-named company shall (except otherwise specially provided by this scheme) prevail and be observed by the United Company.

*Half-Yearly Meetings.*

15. The half-yearly general meetings of the United Company shall be held so soon after the 31st of December and the 30th of June in each year as the directors may deem expedient, but not later than the months of April and October respectively.

*Directors of the United Company.*

16. The number of directors of the United Company shall be ten, subject to reduction to eight in manner following, that is to say:—The first directors shall consist of six from the South Metropolitan board, and four from the Phœnix board; but no vacancy occurring by death, retirement, or disqualification shall be filled up until the number be reduced to eight, and after the number shall be reduced to eight, the number shall not be more than eight nor less than seven; but when the present Secretary and Engineer of the South Metropolitan Company shall retire, he may be appointed a director, and thereupon the number of directors may be increased by one until the next vacancy, when it shall be again reduced to eight or seven, as the case may be.

*Remuneration to the Directors.*

17. The fees payable to the directors continuing in office shall, subject to the provisions of the South Metropolitan Company's Special Act of 1842, not exceed the rates following, that is to say—

| | | |
|---|---|---|
| If the number be | 10 | £4000 |
| " " | 9 | 3700 |
| " " | 8 | 3400 |
| " " | 7 | 3100 |

But if the number be at any time increased by the appointment of the present Secretary and Engineer of the South Metropolitan Company, as provided in the preceding section, the fees shall be increased in like proportion.

*Retiring Allowances.*

18. The compensation payable to any director vacating his office by reason of this amalgamation shall, if he retire immediately upon the confirmation of this scheme, be equal to seven years purchase of the fees receivable by him in the year preceding the amalgamation; but if the number of directors be not reduced to eight at the confirmation of this scheme, any two directors, either separately or together, may, within a period of two years therefrom, retire and receive compensation at the rate aforesaid; that is to say, if they retire within the first year from the confirmation of the scheme, six years purchase of the fees receivable in the year preceding the amalgamation, and if within the second year, five years purchase of the fees receivable in the said year; provided, that all the present directors of the two companies may respectively receive their customary fees until the scheme is confirmed.

*Rotation of Directors.*

19. At the first ordinary meeting to be held in every year after the confimation of this scheme two directors shall retire from office, and the shareholders present in person or by proxy shall elect persons to supply the places of the directors then retiring from office, agreeably to the provisions in the Companies Clauses Consolidation Act, 1845; and the persons elected at any such meeting, being neither removed nor disqualified, nor having resigned, shall continue to be directors until others are elected in their stead, in manner provided by the same act.

*Auditors—Remuneration and Retiring Allowances.*

20. The auditors of the two amalgamating companies in office at the date of the commencement of this scheme, shall continue in office until the first general meeting at which the auditors are appointed held by the United Company. At that meeting the shareholders of the United Company shall elect three auditors, and thenceforth the number shall be three, and the remuneration shall not be more than £75 per annum each, and any person being an auditor of either of the two companies at the time of the amalgamation who is not elected an auditor for the United Company at the said general meeting, shall be entitled to a gratuity equal to two years' salary.

*Officers, etc., of the two Companies to be Officers, etc.. of the United Company.*

21. All officers and servants in the employment of either of the two companies at the time of the amalgamation shall hold their respective offices and employment, and be deemed to be officers of or persons employed by the United Company, until removed in pursuance of this scheme, and they and their respective sureties (if any) shall, for the purpose of any liability incurred by them respectively in respect of such employment and suretyship be deemed respectively to have been employed by and become bound to the United Company, in the place of either of the said two companies.

*Salaried Officers to receive Annuities for Life.*

22. Subject to the provisions hereinafter contained, every salaried officer of either of the two companies who at the time of the amalgamation has been employed by either of such companies for five years or more, and whose office and employment is abolished, or whose services are dispensed with in consequence of this amalgamation, shall be paid by the United Company during his life an annuity, payable quarterly, equal, if he had been in the service of either of the amalgamating companies 20 years or more, to two-thirds of the annual emolument derived by him from his office at the date of the commencement of this scheme; and with respect to any such person who has been in such service less than 20 years, the said annuity shall be diminished at the rate of one-twentieth part for every year less than 20 years during which he has been in such service.

*Annuities may be Compounded for by Payment of a Principal Sum.*

23. Any annuity payable under the preceding section, or any retiring allowance or pension granted to any officer of either of the two companies previously to the amalgamation, may, with the consent of the United Company and of the annuitant, be compounded for by payment of the principal sum for which an annuity of the amount would be purchasable under the table regulating the granting of annuities by the Postmaster-General. And any such principal sum, together with the amount of any retiring allowances granted to directors in pursuance of this or the scheme for the amalgamation of the South Metropolitan and Surrey Consumers Companies, confirmed by order of Her Majesty in Council, dated Oct. 28, 1879, shall be a charge upon the general funds of the United Company, which shall be liquidated by the 1st of January, 1881.

*Salaried Officers not entitled to Annuities may be Compensated.*

24. The United Company may pay to any salaried officer whose office is abolished or whose services are dispensed with in consequence of this scheme, and who is not qualified to receive an annuity under section 22, a sum of money not exceeding one year's emolument by way of compensation for the loss of such office.

*Annuity may be Increased by Sanction of Board of Trade.*

25. The annuity or sum of money payable under either of the last two preceding sections may, in case of an officer who has rendered special services to either of the two companies, with the special sanction of the Board of Trade be increased to a larger amount than is authorized in those section respectively.

*Gratuity to Weekly Servants.*

26. A gratuity not exceeding three months pay may be given to any weekly servant whose services may be dispensed with in consequence of this amalgamation.

*Decision as to Offices Abolished.*

27. The decision of the Board of Directors of the United Company as to whether an office or employment has been abolished, or whether any services have been dispensed with in consequence of this amalgamation, shall be final and without appeal in any case, except that the present Secretary and Engineer of the South Metropolitan Company may, at any time within four years from the confirmation of this scheme, retire from those offices and receive, under the provision of clause 22, an annuity or retiring allowance of the same amount as he would have received if he had retired at the commencement of this scheme; and such annuity, if compounded for, shall be computed at the same amount as it would have been at that date.

*Capital.*

28. Upon this scheme coming into operation, the authorized capitals of the two companies shall constitute the capital of the United Company. The £360,000 stock of the Phœnix Company, limited to a dividend of 7½ per cent., and the £144,000 stock, limited to a dividend of 5 per cent., shall be respectively converted into equivalent amounts of B stock, limited to a dividend of 10 per cent., under the sliding scale, at the standard price of 3s. 6d. per 1,000 feet—viz., the £360,000 into £270,000 and the £144,000 into £72,000, and shall be entitled to all the benefits and incidents of such stock. The capital of the United Company shall be classed A, B, and C, respectively, in accordance with the following

*Statement of Capital.*

The A class is composed of the South Metropolitan stock, issued under Act of October 28, 1879, amounting to £500,000, all of which has been paid in.

The B class is composed of South Metropolitan Company's stock, under Order in Council, amounting to £250,000; a portion of the same unissued, amounting to £18,000. The Phœnix Compony's stock, issued under Act of 1824, £540,000, and under Act of 1864, £542,000, of which latter £27,000 are not called up.

The C class consists of the remaining portion of the £250,000 of the South Metropolitan Company's capital referred to above, amounting to £232,000, unissued; thus making total amount authorized for the United Companies £2,082,000, of which £1,805,000 has been called up, and £277,000 is to be called up.

The unissued capital of £277,000 is to be called up in the following order:

First,—The calls outstanding upon the £360,000 stock of the Phœnix Company, limited to a dividend of 7½ per cent., in amount £36,000, which shall be paid in full, but when paid shall be converted into £27,000 B stock.

Second,—The £18,000 of new capital to be created by the South Metropolitan Company as B stock.

Third,—The 232,000 of C stock.

*Dividend on Different Classes of Shares.*

29. The three classes, A, B, and C, shall participate equally in the profits up to 11 per cent.; but in the event at any time of a larger dividend than 11 per cent. being payable on the said three classes, one-half of such larger dividend beyond 11 per cent. that but for this agreement and scheme would be payable to the holders of B capital, shall be paid to the holders of A capital, in addition to their own proportion of such larger dividend as aforesaid.

*United Company to Issue New Certificates.*

30. The United Company shall, as soon as may be after the confirmation of this scheme, convert all the shares into stock, and call in all certificates in the Phœnix Company, and issue in lieu thereof, and at their own expense new certificates, specifying the class to which they belong, in the name of the United Company.

*Borrowing Powers.*

31. The amount authorized to be borrowed by the United Company shall be the aggregate of the amounts authorized to be borrowed by the special Acts of the two companies respectively, and which at the date of this amalgamation are as follows, viz.:

| South Metropol. Company. | Authorized. £ s. d. | Issued. £ s. d. | To be Issued. £ s. d. |
|---|---|---|---|
| 32 & 33 Vict., c. 130, 1869.... | 62,500 0 0 | 62,500 0 0 | — |
| 39 & 40 Vict., c. 229, 1876.... | 187,500 0 0 | — | 187,500 0 0 |
| 17 & 18 Vict., c. 94, 1854.... | 35,000 0 0 | 35,000 0 0 | — |
| 26 Vict., c. 37, 1863.... | 25,000 0 0 | 25,000 0 0 | — |
| Totals..... | 310,000 0 0 | 122,500 0 0 | 187,500 0 0 |

*United Company may exercise Powers of Raising Capital.*

32. The United Company may exercise in its own name the powers possessed by the two companies at the date of the amalgamation, of raising capital by shares or by borrowing, in the same manner and to the same extent as either of the said two companies might have done before this amalgamation; but in exercising the further borrowing powers of £187,500, the United Company shall give the proprietors of A capital the option of taking it up before offering it to the proprietors of any of the other classes.

*District of the United Company.*

The district to be supplied by the United Company shall be the districts now supplied by the two companies respectively, and the provisions of the South Metropolitan Company's Act, 1876, respecting the illuminating power and purity of the gas to be supplied and the price to be charged for the same, and as to the appointment of referees and examiners to test the illuminating power and purity, and also the provisions for the regulation of the dividend to be paid to the shareholders by the price charged to the consumer, and the appointment of a Public Auditor by the Board of Trade to examine the accounts, and other matters, shall apply to the United Company and the whole of the district supplied by them, and the bye-laws, restrictions, orders, and proceedings of the South Metropolitan Company shall continue in force with, and be applicable to the United Company,

Provided that the penalties imposed by sections 51 and 52 of the South Metropolitan Company's Act, 1876, respecting deficiencies in the illuminating power or purity of the gas supplied in the district of that company, shall not apply to the gas supplied in the district of the Phœnix Company until twelve months after the confirmation of the scheme.

Provided also that if the price of three shillings and fourpence, now charged in the district supplied by the Phœnix Company, is maintained at that or any lower rate, and the price of three shillings, now charged in the district supplied by the South Metropolitan Gas Company, is continued at that or any lower rate, the United Company may, for a period of twelve months after the commencement of the amalgamation, pay dividends on the capital of each company respectively, according to the price charged in the district of each company, as prescribed by section 21 of the South Metropolitan Company's Act, 1876, and subject nevertheless to clause 30 of the scheme of amalgamation between the South Metropolitan and the Surrey Consumers Companies.

*United Company may sell and Dispose of Lands.*

34. The United Company may from time to time sell and dispose of any of their lands and plant which may not be required for the purposes of their undertaking, and a resolution of a general meeting that any of the said lands or plant are not so required shall be sufficient evidence thereof. The proceeds of any and every such sale shall be applied to the general purposes of capital in the United Company.

*Interpretation of Scheme.*

35. If any question arises as to the interpretation of this scheme, whether in connection with the said Acts relating to or affecting the two companies or otherwise, the same may be referred to the Board of Trade for their decision, and the decision of the Board of Trade thereon shall be final.

*United Company to pay Costs of Amalgamation.*

36. The United Company shall pay all the expenses of and incidental to the closing of the accounts of the two companies respectively, and of and incidental to their amalgamation.

## Third Quarterly Meeting of the Central New York Gas Engineers Association.

HELD AT ROCHESTER, N. Y., THURSDAY, FEBRUARY 19TH, 1880.

(Continued from page 130.)

The Association was called to order at 1:30 P. M., when the President announced that Mr. Harrington's paper would be discussed.

The President remarked that the use of block coal would prevent the formation of naphthaline.

Mr. Findlay, of Ogdensburgh, reported an almost similar experience to that of Mr. Harrington.

Mr. Cole, of Corning, asked Mr. Harrington if the naphthaline was more prevalent in winter than in summer.

Mr. Harrington—It is most prevalent in summer.

Mr. Cole—Perhaps your water is introduced in too cold a state into the washer?

Mr. Harrington—No, sir.

The President here suggested that it would be a good idea if every member present would state his experience—as to whether they were troubled with deposits of naphthaline or not—at the same time giving their general process of manufacture, coal used, etc.

The following report gives the answers of the various members:

| Name of Member. | Do you have deposits of naphthaline? | Do you take off at one end, or both ends, of the hydraulic main? | What kind of exhauster do you use? | What kind of condenser do you use? | What kind of washer? | What kind of purifying material? | What kind of coal? | How high are your heats? | Yield per pound of coal. | General Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Feet. | |
| A. C. Wood, Syracuse | No. | Both. | Rotary. | Multitubular. | Dry Scrubber. | Lime. | Youghiogheny, Beaver, and Cannel | 2200 to 2400 | 5.00 | Runs 25 ft. to 6 in. air condenser; has jet of water in condenser. |
| P. Clark, Oneida | No. | One. | None. | Air—6 inch. | ..... | " | Youghiogheny. | 2000 | 4.50 | 15 ft. to exhaust, 15 ft. to condenser; uses oil and sawdust for enricher. |
| J. H. Findlay, Ogdensburgh | Yes. | One. | Steam jet. | Multitubular. | Jet Scrubber. | Iron. | " | 2400 | 4.50 | 6 ft. to exhaust, 3 ft. to washer, 10 ft. to condenser; uses warm water in washer. |
| L. C. North, Cannandaigua | No. | One. | Steam jet. | Air. | Jet Scrubber. | Lime. | " | 2200 | 5.40 | 15 ft. to exhaust, 6 ft. to washer, 6 ft. to condenser. |
| W. Parrish, Seneca Falls | No. | One. | Rotary. | Multitubular. | Jet Washer. | " | Westmoreland. | 2000 | 4.75 | 10 ft. to exhaust, 6 ft. to condenser, 6 ft. to washer. |
| M. Harrington, Niagara Falls | Yes. | One. | Steam jet. | Multitubular. | " | " | Youghiogheny. | 2000 | 5.30 | 25 ft. to condenser; jet in 4-inch pipe for washer. |
| R. E. Cole, Corning | No. | One. | None. | Air. | " | " | Fairmount. | 2000 | 4.75 | 20 ft. to exhaust; traces of naphthaline in inlet to holder. |
| Wm. Cartwright, Oswego | Traces. | One. | Rotary. | Air—10 inch. | " | " | Beaver and Cannel. | 2000 | 4.50 | 10 ft. to washer, 3 ft. to condenser, 15 ft. to exhauster. |
| C. A. White, Rochester | Traces. | One. | Rotary. | Multitubular. | " | Iron Sponge. | Youghiogheny and Westmoreland. | 2200 | 5.00 | 20 ft. to condenser. |
| J. McDougall, Hornellsvile | No. | One. | None. | Multitubular. | Dry Scrubber. | Lime. | Youghiogheny. | 2000 | 4.50 | |

The President remarked that from the reports made it seemed evident that a gradual reduction of the temperature of the gas had much to do with the absence of naphthaline.

On motion, a vote of thanks was tendered to Mr. Harrington for his valuable paper.

On motion, the Secretary was directed to have 100 copies of the tabulated statement printed and distributed to the members of the Association.

Mr. McDougall, of Hornellsville, then read the following paper

ON NATURAL GAS.

In this paper it is not expected that anything new, whereby the gas fraternity may be benefited, will be presented. If we can afford a moment's pleasure, or satisfy a passing curiosity, we shall feel amply rewarded.

The formation of natural gas, like petroleum or rock oil, has long been a subject of speculation for geologists; but while held in the great reservoirs formed for them by nature, they remain a mystery, and it is only when they are brought to the surface that any just analysis of these substances can be made.

Natural gas is found in most of the countries on the globe. It has long been a product of China, and has been utilized by the Celestials for centuries. In the United States this article is by no means unknown, Fredonia, in our own State, being famous for its production. The gas well at West Bloomfield is also well known. The well was sunk in 1865, but, though the volume has been great (Prof. Silliman giving the composition as: marsh gas, 82.41; carbonic acid, 10.11; nitrogen, 4.31; oxygen, 0.23; illuminating hydrocarbon, 2.94;) it has not as yet been made available for the use of man.

It is to the natural gas found near oil wells that we call your attention. It is the supposition that petroleum and natural gas have some connecting links; yet they are found with a rock separation of over three hundred feet. The gas we are supplying to the city of Bradford is obtained from the second sand, while oil is almost invariably obtained from the third sand rock. The area from which this gas is taken is about one mile square, and the rock has been pierced but five feet; yet that small territorty, it is estimated, has delivered fully five million cubic feet daily during the past four years, and is at the present time furnishing light for 5000 burners and 1500 cooking and heating stoves, besides a number of boilers and furnaces. The pressure has fallen from 150 pounds to 10 pounds to the square inch, partly owing to the fact that the rock now has 11 punctures to relieve the pressure where formerly there was but one.

In some portions of the oil field gas is found in the third sand or oil bearing rock. In such case it is from what may be termed an "island." The oil producer looking for a supply of the oleaginous substance, and knowing the depth it is necessary for him to sink his tools, is surprised to find that he has reached the sand 25 feet higher than surrounding wells would indicate, and that gas, instead of oil, is pouring through his casing pipe. But such cases as this are more the exception than the rule. The gas found in the oil fields has about the same composition as that of Fredonia, and which was found to be much benefited by mixing with coal gas. In Bradford we are much troubled by an excess of carbon, which is rather detrimental to ceilings, and would produce much fault-finding among our customers—nothing unusual in any case, as you all must know—were their grumbling not lessened by the extremely low price at which we are able to furnish this article.

For heating purposes ordinary stoves are mostly used, a sufficient number of burners being placed inside. In heating stoves broken pieces of fire brick are placed, and these, upon becoming heated, send forth a cheerful glow, and thus, while the outer man was made comfortable, the imagination is warmed, and the inner man rejoices. For cooking, the gas is used exactly like coal, coke, or wood, no fender of any sort used in broiling; in fact, the natural flame itself is applied directly to the meat to be broiled, and we would almost defy any man to tell whether he ate a steak broiled on coals or in the flame of the natural gas. For lighting, the argand burner is considered the best; still, the batwing has proved quite satisfactory.

Quite an interesting informal discussion followed on the subject of natural gas, and much valuable information elicited from the different members.

On motion of Mr. Cartwright, a vote of thanks was returned to Mr. McDougall for his interesting paper.

Mr. Perry read the following paper on

THE LEGITIMATE MEANS TO BE USED IN THE EXTENSION OF OUR BUSINESS.

In considering the subject on which, at your request, I have prepared this paper, I desire, by way of introduction or explanatoin, to ask your attention for a few moments to a single thought viz.:

The necessity that we, while being aware of the fact that our business has assumed an entirely different place or feature from that which it occupied 20 years ago, and that the future of our business depends not so largely upon its use as an illuminant as upon its use for domestic and business purposes, should use every endeavor to impress this upon the minds of the executive officers of the companies that we represent.

While I do not deem it necessary to say anything on this thought for the purpose of converting any gentleman present, yet, as an introduction to more advanced thoughts, I must premise that we are all aware that business, be it of whatsoever kind, has during the past 20 years undergone many radical changes, which have as a rule been adopted. So much is this the fact, that could those who were our leading merchants before the war come back to the places with which they were identified, I am sure they would fail to recognize them.

The old-time spring and fall trades have gone beyond recall. The visits of merchants from all parts of the country to the various business centres, there to buy upon a credit of 4 or 6 months such a supply of goods as should last them until the changing season demanded a different line, are no more looked for; but to-day the drummer is upon the road looking after the wants of his customers, and endeavoring to secure new ones.

The lumbering old stage coach, a marvel of speed and comfort in its day; the canal packet, ploughing its way lazily along, are things of the past. The locomotive engine, with its palace and hotel cars, wheels us from ocean to ocean with as much comfort as though we were in our own homes, while the ocean and river steamers are alike marvels of speed and elegance.

The farmer no longer is compelled to depend entirely upon manual labor to sow his seed or reap his harvest, for the tireless arm of machinery is at his beck and call, and produces results more economically and more satisfactorily.

The change from the post-boy to our lightning mails, and from that to our telegraph system, are wonders that no man might have dreamed of.

Thus I might go on enumerating the changes that have taken place—by the adoption of improved methods, by the invention and introduction of machinery; but while the paper might be interesting, it would fail of its purpose.

If, then, gentlemen, we must acknowledge that all other classes of business have taken such forward strides, are we to sit still and not see and acknowledge and use the advances and improvements in our own?

It is needless for me to go back to the days of Murdock, Clegg, and the hosts of others who were present, if I may use the expression, at the birth of our business, nor to follow it through its struggles and difficulties to the position it now holds; suffice if I call up a fact within the memory of the youngest member of the Association—that there was a time when, had any one suggested the idea that a charge of coal could be burned off in less than 6 hours, he would have been hooted at; and had he been so audacious as to even hint that a pound of good caking coal ought to produce 4 cubic feet of gas, the cry of the Jews when appealed to by Pilate—"away with him! away with him!"—would have fallen upon his ear; and yet, such have been the improvements, that we think we are obtaining poor results if we do not obtain from 4.80 to 5.20 cubic feet per pound of coal, a record of from 6000 to 10,000 cubic feet per mouthpiece, and our charges burned off at from a minimum of 2 hours to a maximum of 4 hours—and what with the improved machinery science has given us—but little remains of the original of gas manufacture—the revolution is complete.

The changes made have not affected us simply in the manufacture of our product, but in its distribution or sale, by opening up new field for its use.

The employment of gas for domestic purposes—for cooking and heating—has proved a grand success, both as to economy and the results obtained. The gas engine is another claimant, but to this I shall refer later.

You may say that these are new inventions, that they have not stood the test of years, that there may be some chicanery about them likely to mislead. True, the gas stove and engine are but children, if I may use the expression, of what I believe will be a large and vigorous family of claimants for our product. They have been subjected to the severest tests in Europe, and have passed the ordeal successfully; and a prominent feature in the business of some of the European companies is not alone the use, but the manufacture and sale of stoves, etc.

I regret, indeed, that this portion of our business, while not neglected, has had a hard struggle to gain even a foothold among us, and it seems that we, who, as a people, are looked upon, as the sharpest, shrewdest, and first to take hold of any invention that casts even a shadow of success, should allow this one, which needs no experiment on our part, but has more than realized all that has been claimed, to lie "unwept, unhonored, and unsung."

I own that I can see one loophole by which we may escape the charge of neglect, yet one which, if rightly looked upon, should condemn us. I refer to the fact that in the formation of most of the companies of this country the ground-work has been for speculative purposes; and while our works have been built perhaps with all the latest improvements placed therein, there hangs over us like a funeral pall a fabulous capital and unlimited bonded ndebtedness—leeches that fasten upon our very vitals, that only years of

toil and worry enable us to shake off and feel that we are free. Free, forsooth! A baby, when we should be in the prime and vigor of manhood!

I cannot but believe that the company should be the head and front of all work in connection with the distribution of its products. By this I mean the adoption to a modified extent of the plan so successfully carried out by the Paris Gas Light Company.

Here you will say that I have created an entirely new department—something so radical that no company will think of, let alone adopt. True, it is a radical change, but is it more so than some of the changes that have taken place in our business? By no means. And though I may be set down as a dreamer, I cannot but believe that the time will be when all this and more will be entirely under the control of the company's superintendent.

With these preliminary explanations, I will now offer a few suggestions on the following very important topics:

Frst, on the interference of officers whose duties do not bring them in contact with the consumers. I apprehend that all, or nearly all, of the fraternity within the sound of my voice have experienced more or less of the annoyance of over-zealous officials endeavoring to do something for which they are not fitted, either by nature or experience. My opinion is that a great deal of harm is done in this way, unintentionally, of course, as it is not at all probable that the gentlemen who direct the affairs of our respecttve companies would designedly place any obstacles in the way of our success.

My theory of running or conducting the business of a gas company is this:—that there should be a thoroughly competent superintendent; one entirely familiar with the manufacture and distribution of gas, a courteous, and accommodating gentleman, whose chief aim should be to advance the best interests of his company, and dispense equal and exact justice to all his customers. If it is proved that he is competent to do this, he should not be interfered with by any other officer of the company, but should be all that his title implies—a superintendent, in fact. If he is not competent, the company is certainly better off without him.

Let is be understood that I do not wish to insinuate that the superintendent of a company is the only essential; but I do want it understood that I am opposed to the curtailment of the rights and privileges of anyone acting in this very trying and oftentimes very thankless position. If the superintendent is not qualified to know what is wanted, and when it is wanted, who in the name of goodness is? If the superintendent is not competent to judge of and decide upon the merits of his subordinates in their respective capacities, who can be? If the superintendent is not capable of settling all controversies, quieting contentions, and settling all disputes, who would you seek for that is? The old adage that "too many cooks spoil the broth" is frequently very forcibly illustrated in the management of the business of gas companies.

Having briefly given expression to my thoughts on the topic just referred to, I now wish to say a few words on the cultivation of friendly relations between the consumers and the employees whose duties bring them personally together. In connection with this subject I will state as my opinion that, as we have arrived at a comparatively high degree of economy in the manufacture of gas, it would be well to give some attention to its sale.

What would be thought of a man, as a business man, if he were to invest a large amount of money, build a large factory for the manufacture of some commodity, and give no attention to its sale? Yet such is practically what has been done by gas companies since their inception up to within a very short time.

But to return to my subject. I think that it is the duty of the superintendent to see that his assistants are agreeable to his customers. It is well understood that the proprietors of drygoods houses, grocery stores, tailor shops, etc., employ their assistants with especial reference to their social qualifications, as well as their ability to perform the manual labor required of them.

Commencing with the individual who takes meter statements, he ought to be intelligent, of good address, ready at all times to answer any civil question asked him. If it so happens that anyone may ask him during his rounds "How much gas have I consumed this month?" answer courteously, "I am instructed not to answer that question, but they will cheerfully give that information at the office." Or what is better still, give them the desired information; for I hold that every single shadow of mystery thrown around an already very mysterious business to the masses, tends only to widen the gulf between consumer and company. And I would like to ask right here what is the reasonable objection to answering the questions of consumers? It may be said that there may be a mistake in the figures. If there is it goes to the bill, and where is the difference? Meters are rarely reviewed until after the bill is rendered and complaint made. My judgment is that right here, at the very commencement of your dealings with the consumer there is an opportunity of establishing amicable relations. So much for the taker of statements. We next come to the individual who distributes the bills, and receives whatever payments are offered him. His, too, is a position of responsibility, and calls for a man of courteous manners, who has a high sense of honor, and, above all, an amiable manner; firm, but civil, and ready to answer all questions coming within the scope of his duty, or politely referring the complainant to the proper officer, when the necessities of the case require it.

Such a man is sure to win golden opinions from patrons, and redound greatly to the interest of the company. Next in order comes the office assistants, and I am disposed to treat very kindly this much-abused class of men, for I think it requires a man of charming manners to answer all the questions usually asked over the counter of a gas company's office, and still retain the placid expression and genteel deportment so essential to success. Unfortunately, it is too often the case that the office men are not subject to the directions of the superintendent, as I claim that the superintendent should be over all. This frequently creates confusion, and tends in a very great degree to weaken the discipline so much needed; and even the men themselves get confused in feeling compelled to accept directions from more than one source.

It has always seemed to me that there should be a person in the office of every gas company whose particular duty should be to attend to complaints—an adjuster, as it were—fully empowered to settle all disputed points, as it is certainly very annoying to the consumer to go to one with a complaint, be referred to another, and another, and so on ad infinitum, as is frequently the case.

Here I propose to let this subject rest, and say a few words on the propriety of soliciting consumers, the methods to be employed, and inducements offered. We will take it for granted that nobody uses coal oil from choice; they feel that they have been driven to it by the exactions of the gas company. Whether this is so or not the individual superintendent must decide for himself. I think that, in the majority of cases, the company is to blame indirectly, if not directly, for the very large number of portable powder magazines occupying the stores and dwellings on its line of mains, known as kerosene lamps, shedding forth their weakly rays, and emitting their sickly odors. In short, there they are; the causes that led to their use we will not stop to discuss—the question is, how to get rid of them.

I am a firm believer in asking people to discontinue their use and adopt gas; but they say, "We cannot burn your gas. It costs more than I can pay," or, "The company has swindled me once, and shan't have another opportunity," or, "I am getting just as good a light for one-quarter of the money," or, "It is going to cost me considerable to arrange for burning gas; and I guess I will make the lamps answer."

These, and a score of other reasons, are given, and in many cases all the persuasion that can be brought to bear cannot alter their determination. We do not expect to convert everyone to the use of gas; but that there can be a large number of consumers obtained, by soliciting, in every community I have not a single doubt

My plan of soliciting would be to have a good man see personally the proprietor of every establishment where lamps are used, and ask him politely to patronize the company by using gas. If he declines, ask him his reasons. These having been given, the solicitor can easily determine whether there is any use in further parley; if he objects on the ground that it will cost him so much for new burners, offer to furnish him free of cost an entire new set; if he still objects on the plea that the cost of meter connections is more than he cares to pay for, connect his meter free of expense to him; and, lastly, if he says he does not care to lose the money he has paid for his lamps, take them off his hands at a reasonable price.

I have one instance in my mind now where I bought lamps to the amount of $18.00, since which time the gentleman from whom I bought the lamps has paid the company over $200.

I cite this as an example of what might be done by trifling inducements being held out. After securing the customers take good care to retain them. You ask, how can this be done? I answer, by fair treatment; furnish him a *good* article of gas; see that his burners are adjusted to meet the requirements of proper combustion. If you find too much pressure, turn off the meter cock a little; in short, do everything you can to keep the bill down. These attentions will certainly add to your list of consumers, and enrich the treasury of your company.

In a conversation once with a gentleman who has had quite an extensive experience in gas matters, I was astounded to hear him say that he believed in carrying a high pressure on his mains. I asked him his reasons, and he said he wanted high bills. I remonstrated with him, when he replied that he was not watching the interests of the consumer but those of the company he represented—a very grave mistake, in my opinion.

I will conclude my paper by referring briefly to gas stoves and gas engines.

With the former my experience is limited, with the latter I have worked considerably, and have one working very satisfactorily in this city, which I would be pleased to show you at your convenience. The gas engine, for in-

termittent power, is beyond doubt the most economical motor known. The one above referred to I started about three months ago. It is a two-horse power, and is used to run a sausage cutter. Its convenience, safety, cleanliness, and economy is striking indeed; and the gentleman who purchased it says he would not part with it for twice the amount it cost him if he could not replace it.

I must state right here that, owing to positive objections on the part of my board of directors, I have been unable to do but little in the direction of increasing my sales of gas; they positively refused to have anything to do with either stoves or engines, which, of course, prevented my doing much. It is sincerely to be hoped that there are not many such boards controlling the affairs of your respective companies.

In conclusion, I will say that I am in favor of using all legitimate means to extend the sale of gas, either for illuminating, cooking or power. As far as I am concerned, I do not propose to allow any feeling of false pride or delicacy to deter me from soliciting business, provided, in all cases, that I am left to exercise my own judgment in the matter. Is our business so different from all others that we must keep silence instead of advertising it as other men in different kinds of business do? Are we ashamed of our calling? I hope not.

I know that the honorable gentlemen who are engaged in the manufacture and distribution of coal gas, known as superintendents (or engineers if you like, although I do not fancy the word) would scorn to do a mean act, and are just as honest and truthful as any business men in the world; yet it is a well-known fact all, or nearly all of the fraternity are branded as dishonest and untruthful. Why is this; I will ask?

May we not look to ourselves for an answer to the question. It is the mystery surrounding our business that makes people suspicious. Let us, therefore, endeavor to change our mode of operations. Carry our business and our product out to the people. Show them that 'tis desirable, that 'tis useful. Meet them half way. Show them that you have put off the old way, put on the new. Let your light shine so that it may penetrate the mist that has so long enveloped and hung like a pall around the gas companies, and then you will fully realize that your calling is pleasant, profitable, dignified and legitimate.

On motion, a vote of thanks was tendered to Mr. Perry for his valuable and interesting paper.

On motion of Mr. McDougall it was ordered that, when we adjourn, we adjourn to meet at Syracuse, N. Y., on the 20th May, 1880.

On motion, Messrs. McDougall and Kingsbury were appointed a committee to work up the membership of the Association from the southern tier.

A motion was passed requesting Mr. White to prepare a paper on Iron Sponge Purifying material for the next meeting.

Mr. Harrington was requested to prepare another paper on naphthaline.

Mr. Wm. Cartwright was also requested to prepare a paper on the same subject from his point of view.

Messrs. Findlay and Humphreys were requested to prepare papers on Oil Gas.

On motion of Mr. Harrington the Secretary was authorized to employ a stenographer at the meetings of the Association.

On motion the Association adjourned.

CLEMENT A. WHITE,
*Secretary.*

## The Cost of Transportation.

The most important subject before American ironmasters to-day, next to that of cheap production, is cheap transportation. There is need of this not only to get the product of works to market at the very lowest rate, but also to bring the raw materials to the works. Indeed, this question is so intimately connected with that of cost of production, that it must be included in all discussions of this topic.

We have cheap raw material, or, rather, we have deposits of coal and ore that can be purchased at a very small cost; but the long stretches of transportation needed to get these materials to the centres of manufacturing production, or, if they are manufactured where found, the long hauls that must be paid for to get the manufactured products to the points of consumption, are not only a heavy tax on these industries, but prevent development of many rich districts.

In view of this fact, any information bearing on the cost of transportation is of the utmost value, as indicating the line in which efforts must be directed to reduce this cost. The yearly reports of the Pennsylvania Railroad always contain information on this point that is of the greatest value. The character of this road and of its grades is too well known to need much comment. On the Western Division the grades are very heavy, necessitating small trains, great wear and tear of rolling stock, and a very heavy cost for fuel, etc. This is in some measure offset by the cheap and abundant fuel. On the whole, the results on this road may be assumed as a fair example of what can be done on a well-built and well-managed road. The following table from the last report of this road shows the cost of moving freight and the earnings:

| Freight. | Penna. RR. and branches. | U. RR. N.J. and branches. | Philada. and Erie Railroad. | Lines east Pbg and Erie. |
|---|---|---|---|---|
| Length of road miles | 1,092.05 | 425.5 | 283 | 1,806 |
| Average earnings per ton per mile from transportation of freight | 0·796 cts. | 1.473 cts. | 0·512 cts. | 0·824 cts. |
| Average cost of transporting each ton of freight one mile. | 0·427 cts. | 1·012 cts. | 0·354 cts. | 0·480 cts. |
| Average profit per ton per mile | 0·369 cts. | 0·461 cts. | 0·158 cts. | 0·344 cts. |

This table shows that on the main line of the Pennsylvania Railroad the average receipts per ton per mile were about 8 mills, and the cost per ton per mile 4¼ mills, while on the Philadelphia and Erie the cost was three-quarters of a mill less, or a fraction more than 3½ mills per ton per mile.

This shows a surprising result. Some years ago, at a meeting of the American Society of Civil Engineers, a very prominent member expressed an opinion that in time freight would be moved at a profit of three-fourth of a cent per mile per ton. The opinion was laughed at. What was then regarded as chimerical, this report shows is now a fact.

Commenting on the table the Board of Directors say:

"The number of tons of freight moved in 1879 over your main line and branches, including 773,461 tons of fuel and other materials for the company's use, was 14,457,502 tons, embracing 6,379,995 tons of coal. For the previous year, 11,627,228 tons were moved, showing an increase of 2,830,274 tons, or about 24 3-10 per cent., while the increase in coal tonnage was 1,372,184 tons.

"The most marked increase was in the mileage of local freight westward, which amounted to 46 99-100 per cent. The tonnage mileage of through freight westward was also largely increased, the percentage being 33 53-100. The total tonnage mileage of through and local freight eastward was 1,742,439,006, and westward 394,269,881, an increase of 19 88-100 per cent in the former, and 45 30-100 per cent. in the latter. *It will thus be seen that the company earned the larger portion of its revenue from the transportation of a large volume of traffic at a small profit;* while the heavy increase in local business shows that it is carefully fostered, and is not burdened for the benefit of through traffic. Of the 13,684,041 tons moved upon the main line and branches, 2,076,540 were through, and 11,607,501 local freight."

The most important statement in the foregoing is that we have italicised. The average receipts per ton per mile being on the main line 0.796 cents per mile, there must have been a great deal at a very much lower figure. A large part of this was doubtless petroleum, which was moved at a ruinously low rate; but the report is evidence that large volumes of traffic can be moved at low rates, which is a fact of the utmost importance to ironmasters, as their freight is of low class, in large volume, and should be moved at low rates.—*Iron Age, April* 16.

## The Holly Steam Heating in Practice.

The experiment of heating buildings by steam supplied from a central generator and distributed to customers at their dwellings and places of business has had a trial of two seasons in Springfield, and has created general interest.

It is hardly time to pass final judgment on the matter, as many points which would affect the verdict have not had a thorough development. Generally speaking, however, the promise of the new enterprise justifies very sanguine expectations, and nearly all those who have used the Holly steam during the past winter are ready to pronounce it a complete success, and are anxious to have it established on a permanent footing. The testimony of the patrons is almost without exception so enthusiastic as to suggest the suspicion that they are all stockholders in the gas company. The company, too, are well pleased with the results, and are ready for a more extensive trial another season.

Touching the expense of this method of heating, as compared with others opinions vary, and, so far as the experiment at Springfield is concerned, this point cannot be regarded as settled. Based on the figures of last year, the testimony of the patrons goes to show that it is cheaper than furnace heat, about as costly as home-made steam, and more expensive than economically managed stoves. This is the result of the comparison of actual expenditures, and does not take into consideration the amount and quality of heat obtained, nor the annoyances and inconveniences resulting from ordinary methods which are obviated in the Holly system.—*Springfield Republican.*

THE AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY

A. M. CALLENDER & CO.,
PROPRIETORS.

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LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
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FRIDAY, APRIL 16, 1880.

## Official Report of Examinations of Gas for two Weeks ending April 10, 1880, made at the Photometrical Room of the Department of Public Works.

### Corrected Illuminating Power.

| Mar. 1880. | Time of Day at which Test were made. | New York Gas-Light Co. | Manhattan Gas-Light Co. | Mutual Gas-Light Co. | Metropolitan Gas-Light Co. | Harlem Gas-Light Co. | Municipal Gas-Light Co. |
|---|---|---|---|---|---|---|---|
| | | * | * | † | * | * | † |
| 29 | | 18.61 | 18.70 | 27.85 | 20.95 | 17.47 | 29.93 |
| 30 | Between 9.30 A.M. | 17.42 | 20.17 | 27.65 | 21.33 | 17.34 | 29.16 |
| 31 | and | 17.05 | 18.66 | 27.82 | 21.01 | 17.30 | 28.63 |
| April 1 | 1 P.M. | 17.82 | 18.81 | 27.07 | 21.17 | 17.49 | 27.47 |
| 2 | | 18.41 | 19.08 | 27.26 | —— | 17.70 | 28.96 |
| 3 | | 18.32 | 19.72 | 26.77 | —— | 17.94 | 28.76 |
| | Average | 17.96 | 19.19 | 27.40 | 21.15 | 17.54 | 28.82 |
| 5 | | 19.74 | 19.94 | 27.07 | 20.53 | 17.53 | 31.02 |
| 6 | | 19 15 | 19.56 | 27.05 | 20.75 | 17.59 | 29.62 |
| 7 | | 19.07 | 18.69 | 27.82 | 20.97 | 17.43 | 30.09 |
| 8 | | 18.67 | 18.68 | 29.19 | 21.47 | 17.66 | 29.90 |
| 9 | | 18.42 | 18.72 | 27.27 | 21.29 | 17.33 | 28.66 |
| 10 | | 18.19 | 18.42 | 27.04 | 20.45 | 17.15 | 29.57 |
| | Average | 18.87 | 19.00 | 27.60 | 20.91 | 17.45 | 29.81 |

* Five foot lava tip with check.
† Bray's slit union, No. 7.

E. G. LOVE, Gas Examiner.

THE DOCTORS are after the electric light. They say it will eventually destroy the eyesight, and one medical man says he was blind for three days, the result of attending a concert in San Francisco in a hall supplied with the electric light. Edison has given us this eye destroyer, now let him give us invulnerable eyes.

## Shearing Strength of American Woods.

Mr. John C. Trautwine communicates to the *Journal of the Franklin Institute* the results of some valuable experiments on the shearing strength of American woods.

The specimens tested were in the shape of cylindrical pins .64 of an inch (or full $\frac{2}{3}$ inch) in diameter. The central pieces sheared off were $\frac{2}{3}$ inch long. The single circular area of each pin was .322 of a square inch, and that of the two areas simultaneously sheared, .644 of a square inch. The testing machine used was made by Rieble Brothers, and the figures obtained were the following, in pounds per square inch:

| | |
|---|---|
| Ash | 6,280 |
| Beech | 5,223 |
| Birch | 5,595 |
| Cedar, white | 1,372 to 1,519 |
| Cedar, Central American | 3,410 |
| Cherry | 2,945 |
| Chestnut | 1,535 |
| Dogwood | 6,510 |
| Ebony | 7,750 |
| Gum | 5,890 |
| Hemlock | 2,750 |
| Hickory | 6,045 to 7,285 |
| Locust | 7,176 |
| Maple | 6,355 |
| Oak, white | 4,425 |
| Oak, live | 8,480 |
| Pine, white | 2,480 |
| Pine, yellow, Northern | 4,340 |
| Pine, yellow, Southern | 5,735 |
| Pine, yellow, very reninous | 5,053 |
| Poplar | 4,418 |
| Spruce | 3,255 |
| Walnut, black | 4,728 |
| Walnut, common | 2,830 |

—*Iron Age.*

## Woodwork Burned by Steam.

*The American Manufacturer* says: "At the Crescent Steele Works, in this city, a steam pipe 2½ inches in diameter, carrying from 90 to 100 pounds pressure, was laid under ground about three years ago, encased in common pine boards about one inch thick. A few days since occasion was had to dig up the pipe, and the whole length of the wooden drain was found to be charred and apparently burnt about three-fourths of the thickness of the wood, the other portion being partially rotted. The whole inside of the drain was turned to charcoal, with here and there spots of white ashes, showing that ignition had actually taken place. It seems probable that if the casing had not been excluded from the air by the earth covering it, it would have blazed and been entirely consumed.

"It is generally believed that a steam pipe cannot set fire to wood, but this case seems to prove the contrary, and it may explain the origin of so many mysterious fires."

## Pneumatic Clocks

Within the last week handsome public illuminated timepieces have been erected in the middle of the causeway of the leading thoroughfares of Paris. These are all in communication with the works of the new Pneumatic Clock Company, in the Rue St. Anne. By means of subterranean tubes this company receives the time direct from the Observatoire every morning, and regulates all the timepieces in connection simultaneously.

In future it will be possible to have the correct time laid on in any house, like gas or water, at the trifling cost of from three to five centimes per clock per day.—*Iron Age.*

## Price of Gas Reduced in Rochester.—

ROCHESTER GAS LT. CO., April 2, 1880. By order of the Board of Directors, the price of gas, net (in case of prompt payment according to regulations) is reduced to $2 per 1000 cubic feet for all consumers after the first instant. MATT. CARTWRIGHT, Sec.

The Citizens' Gas Company of Rochester have also issued a notice to the effect that the price of their gas has been reduced from $2.50 to $2 per 1000 feet.

## Gas Stocks.

**Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.**
**(with W B Scott & Co.,)**
24 PINE STREET, NEW YORK CITY.
APRIL 16, 1880.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share. ☜

| | Capital. | Par. | Bid. | Asked. |
|---|---|---|---|---|
| *Gas Co.'s of N. Y. City.* | | | | |
| Central | 466,000 | 50 | 50 | 60 |
| Harlem | 1,800,000 | 50 | 65 | 75 |
| " Bonds | 170,000 | | | 103 |
| Manhattan | 4,000,000 | 50 | 198 | 202 |
| Metropolitan | 2,500,000 | 100 | 137 | 145 |
| " Scrip | $1,000,000 | ... | 99 | 102 |
| Mutual | 5,000,000 | 100 | 78 | 85 |
| " Bonds, gold | 900,000 | 1000 | 100 | — |
| Municipal | 1,500,000 | 100 | 185 | 200 |
| " Bonds | 750,000 | | 106 | 110 |
| New York | 4,000,000 | 100 | 106 | 110 |
| Northern | 270,000 | 50 | — | 100 |
| *Gas Co's of Brooklyn.* | | | | |
| Brooklyn | 2,000,000 | 25 | 120 | 125 |
| Citizens | 1,200,000 | 20 | 55 | 60 |
| " S. F. Bonds. | 320,000 | 1000 | 100 | 105 |
| Fulton Municipal | 1,500,000 | 100 | 94 | 97 |
| Peoples | 1,000,000 | 10 | 25 | 30 |
| " Bonds. | 290,000 | ... | 90 | 95 |
| " Scrip | 250,000 | ... | 75 | 85 |
| Metropolitan | 1,000,000 | 100 | 60 | 70 |
| Nassau | 1,000,000 | 25 | 50 | 55 |
| " Ctfs. | 700,000 | 1000 | 85 | 95 |
| Williamsburgh | 1,000,000 | 50 | 75 | 80 |
| " Scrip | | ... | 98 | 103 |
| Kings Co | 135,000 | 100 | — | 50 |
| " Bonds. | 40,000 | — | — | — |
| Union Co. E. N. Y. | | 25 | — | 50 |
| Richmond Co., S. I. | 300,000 | ... | 70 | 80 |
| *Out of Town Gas Companies.* | | | | |
| Bath, Maine | 70,000 | 100 | | |
| Buffalo Mutual, N.Y | 750,000 | 100 | 65 | 70 |
| " Bonds | 200,000 | 1000 | 95 | 100 |
| Baltimore, Md. | 2,000,000 | 100 | 185 | 190 |
| " Ctfs., gold | 1,000,000 | | — | 103 |
| Bayonne, N. J. | | 100 | | 90 |
| Brockport, N. Y. | 25,000 | 100 | ... | 80 |
| Citizens, Newark | 918,000 | 50 | 85 | 90 |
| " " Bds. | 124,000 | — | 105 | 10 |
| Chicago Gas Co., Ills | | | 125 | — |
| Cincinnati G. & C. Co. | | | | 190 |
| Derby of Conn. | 160,000 | 100 | 60 | 80 |
| East Boston, Mass. | | 25 | 114 | 120 |
| Elizabethtown, N. J. | 300,000 | 20 | — | 130 |
| Fort Wayne, Ind. | | 100 | ... | — |
| Hannibal, Mo. | 100,000 | 100 | 95 | 100 |
| Hartford, Conn. | 700,000 | 25 | 120 | 125 |
| Hempstead, L. I. | 25,000 | 100 | ... | — |
| Halifax N. S. | 400,000 | 40 | 148 | 150 |
| Hamilton, Ontario | 150,000 | 40 | 117½ | |
| Jersey City | 750,000 | 20 | 150 | 160 |
| Jamaica, L. I. | 25,000 | 100 | ... | — |
| Jacksonville, Ill. | 120,000 | 50 | 100 | ... |
| Lewistown Maine | 400,000 | 100 | 70 | 80 |
| Laclede St Louis Mo. | 1,200,000 | 100 | 93 | 96 |
| Long Branch | | 20 | 30 | 40 |
| New Haven, Conn. | | 25 | 120 | 140 |
| Peoples, Jersey City | | ... | 40 | 50 |
| " " Bds. | | | | 5 |

| | | | | |
|---|---|---|---|---|
| Peoples of Albany... | 650,000 | 100 | — | 10 |
| " Bonds | 350,000 | 1000 | — | - |
| Peoples of Baltimore | | 25 | 100 | 102 |
| " Bonds.... | | | 106 | — |
| Plainfield, N. J..... | 80,000 | 100 | — | 105 |
| Perth Amboy ..... | | 25 | — | 95 |
| Pittsfield, Mass..... | | | 120 | 130 |
| Rochester, N. Y..... | | 50 | 70 | 80 |
| " Citizens | | 100 | 50 | 60 |
| Rondout & Kingston | | | 75 | 80 |
| St. Louis Missouri.. | 600 000 | 50 | 300 | — |
| Stillwater, Minn..... | 50,000 | 50 | — | 26 |
| Saugerties, N. Y .... | 15,000 | 100 | 95 | 100 |
| San Francisco Gas-Co., S. Fr'isco Cal. | | | 82 | 83 |
| Toledo, Ohio..... | | | 95 | 97 |
| Troy, Citizens..... | 600,000 | 100 | — | — |
| Washington, D. C... | 1,500,000 | 20 | 170 | 185 |
| " Scrip | 500,000 | 20 | 100 | 110 |
| Woonsocket, R. I.... | 150,000 | 100 | 80 | ... |
| Wilmington, Del.... | | 50 | 174 | ... |
| Yonkers..... | | 50 | — | 70 |

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# Ammoniacal Liquor and Coal Tar.

## SEALED PROPOSALS

will be received at the office of the Cincinnati Gas Light and Coke Company, Cincinnati, Ohio, until 12 o'clock noon, May 1st, 1880, for the Ammoniacal Liquor produced at the works of said Company, extending over a period of *five* (5) *years* from July 1, 1880.

The Liquor will be delivered in car-tanks on side track, in tank barges on the river, or at any point on the line of the Gas Company's premises. The strength to be of the same average as at present.

Bids will be received at so much per ton, of 2000 pounds, of coal carbonized. Payments to be made monthly. Security in the sum of $10,000 will be required. The Company reserves the right to reject any and all bids. If desired by the successful bidder, arrangements can be made for the purchase of the Coal Tar produced during the same period.

Address,

**ROB'T. BROWN, Jr., Sec'y,**
*Cincinnati Gas Light and Coke Co., Cincinnati, O.*

## SITUATION WANTED

BY A MAN THIRTY YEARS OF AGE,

**Thoroughly Qualified to take Charge of Small Gas Works.**

Seven years' experience in an engineer's office and around works. Would take a subordinate position. Open to correspondence. Good references. Address, "ENERGY,"
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## ENGAGEMENT DESIRED.

**A Person of Practical Experience as Superintendent of Gas Works**

Desires an engagement where strict attention to the duties confided to him will secure ultimately a fair compensation. References can be given. A good, permanent position is desired, where future salary would depend on success of management. Address, "ENGAGEMENT,"
Office Gas Lt. Journal.

## WANTED,

**A First-Class Foreman,**

**IN A GAS WORKS.**

One who has had experience in that capacity. Address naming references, "A. B. C.," Office Am. Gas Lt. Journal.

## FOR SALE,

**A SMALL AND PROFITABLE GAS WORKS,**

In a thriving town of 3000 inhabitants. 2000 feet of Natural Gas per day. For particulars apply at office of this Journal, or to McNab & Mars, 36 Cortland St., New York.

## Complete Gas Works

**FOR SALE.**

The Iron Work for a complete Gas Works, with 8 inch connections, consisting of 4 Purifiers, 8 ft. by 10 ft., with Dry Centre Valve, Multitubular Condenser, Scrubber, Bye-pass Valves, 5 feet Station Meter, and Bench Casting for four benches of 5's. All nearly new, and in good condition.

THE MUTUAL GAS LIGHT CO.,
497 tf St. Joseph, Missouri.

# WATER GAS.

## Strong Gas-Fuel and Light Co.,

**No. 120 Broadway,**
(EQUITABLE BUILDING), NEW YORK.

**This Company is the Sole Proprietor for the State of New York of the Strong and Lowe Processes for the Manufacture of Water Gas.**

Works are now being constructed according to the Strong patents at Yonkers, to supply that city with gas for

**Light, Heat, and Power.**

One pair of generators, the cost of which will not exceed $18,000, will make about 400,000 cubic feet per day.

The Lowe system is already in successful operation for lighting in more than thirty places in the United States, and in many of our large cities.

The rapid progress that water gas is making in the public favor, and the great economy and efficiency of the Strong and Lowe processes over all others for its manufacture, should secure for these processes a careful examination on the part of all gas companies now existing or about to be formed.

N. B.—For licenses or further information, appply at the office of this company, as above.

Dated March 8, 1880.

## CONNELLY & CO.,

SOLE MANUFACTURERS OF

**Iron Sponge Purifying Material**

AND

**CONNELLY'S JET EXHAUSTERS.**

**PITTTSBURGH, PA.**

## C. GEFRORER.

Manufacturer of

**GAS BURNERS,**

GAS HEATING AND COOKING APPARATUS.

**FITTERS' PROVING APPARATUS, ETC.**

No. 248 North Eighth Street, Philadelphia.

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WE HAVE ON HAND, IN STORE, FOR IMMEDIATE SHIPMENT,

## A Large Quantity of Cast Iron Pipe,

**WITH A FULL ASSORTMENT OF SPECIAL CASTINGS.**

MOST OF THEM ARE GAS WEIGHTS—PART OF THEM COATED WATER WEIGHTS.

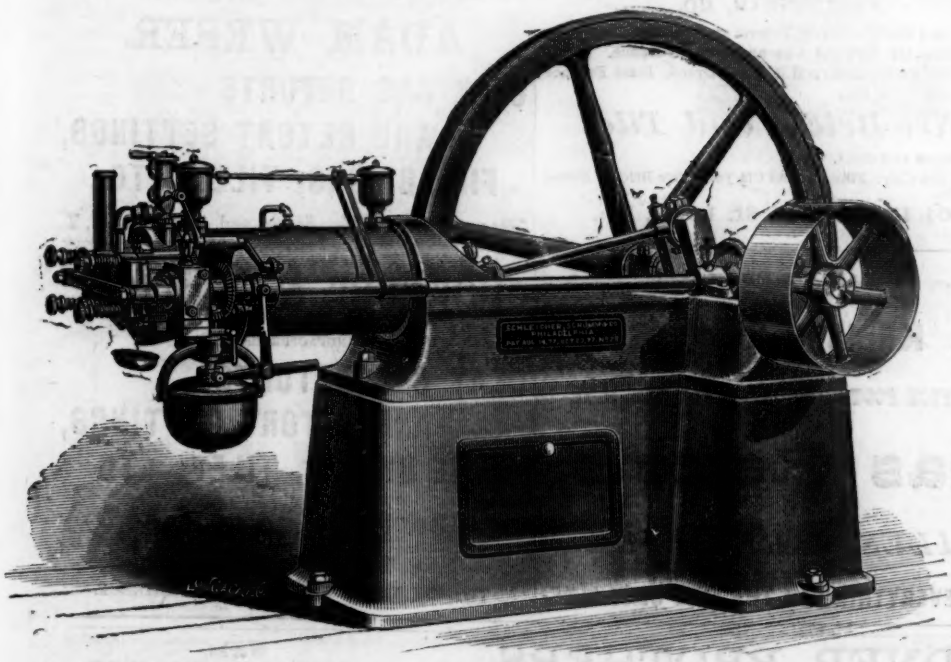
**Made by Warren Foundry, Wood, McNeals, and Camden Iron Works,**

UNDER CAREFUL INSPECTION, AND ARE OF THE VERY BEST QUALITY.

**PANCOAST & TARR, 28 Platt St., New York.**

# SILENT GAS ENGINE.

***Always Ready to be Started, and to give at once Full Power.***



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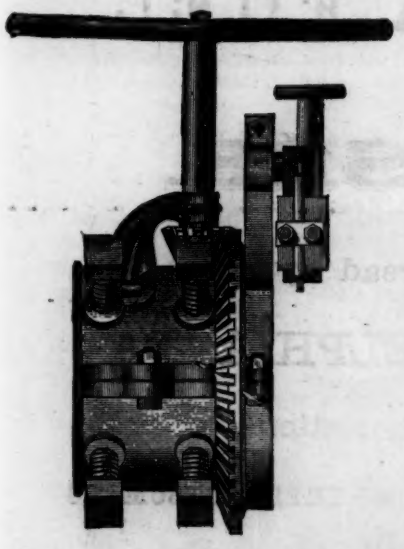

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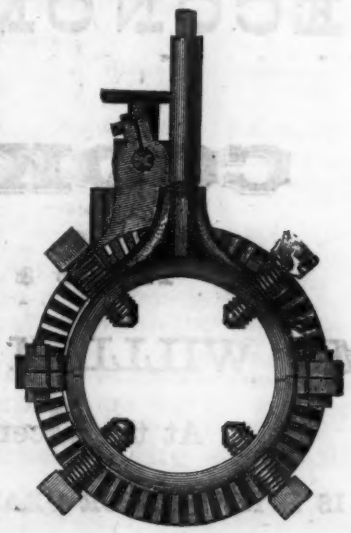

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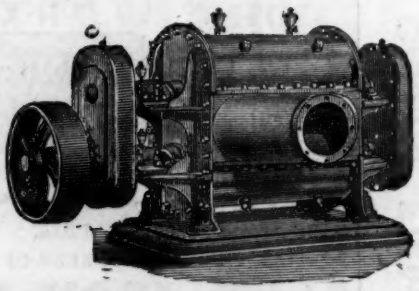

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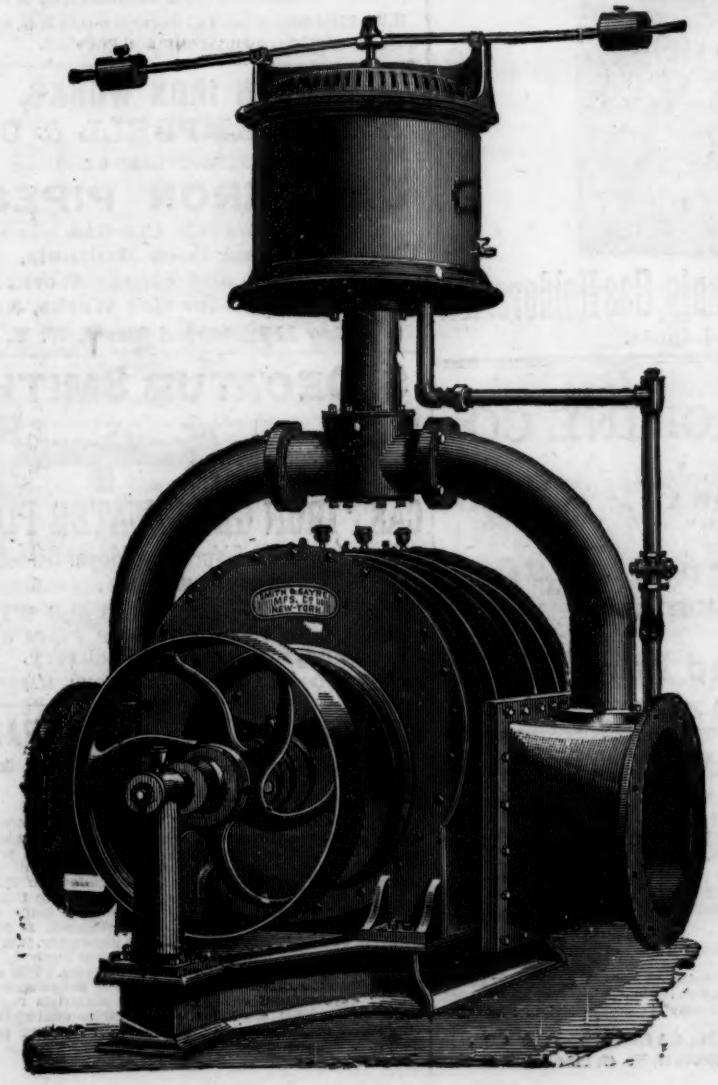

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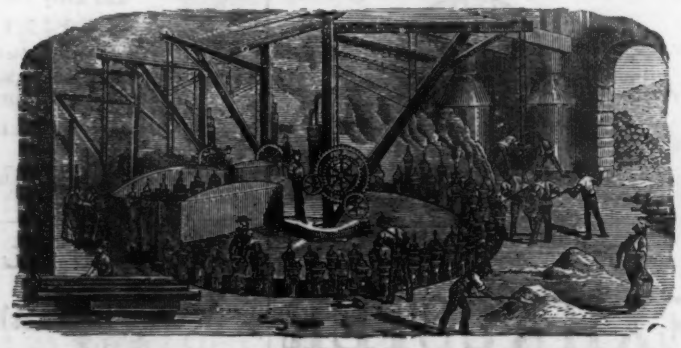

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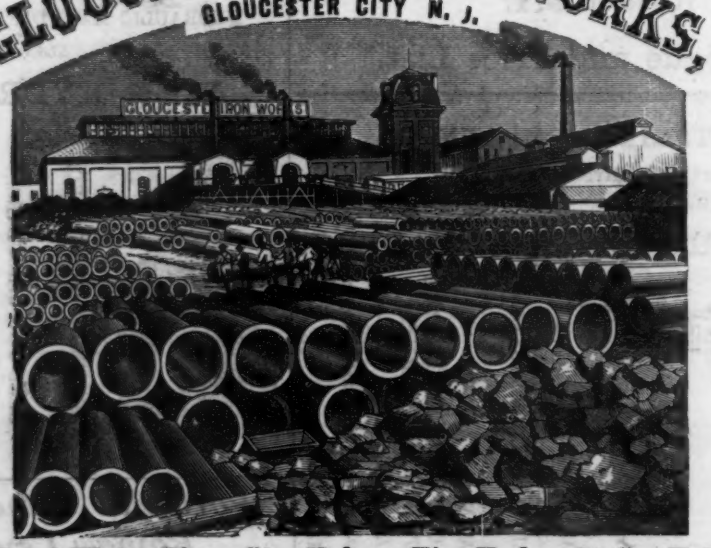

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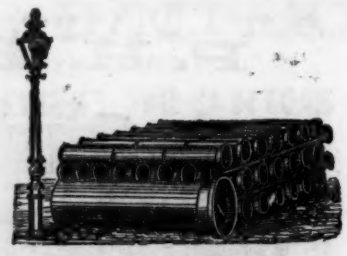

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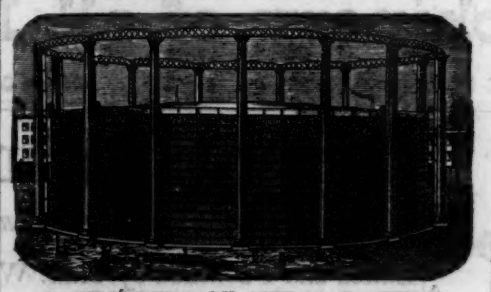

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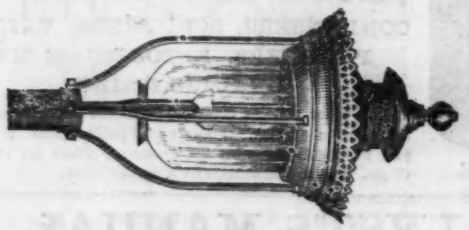

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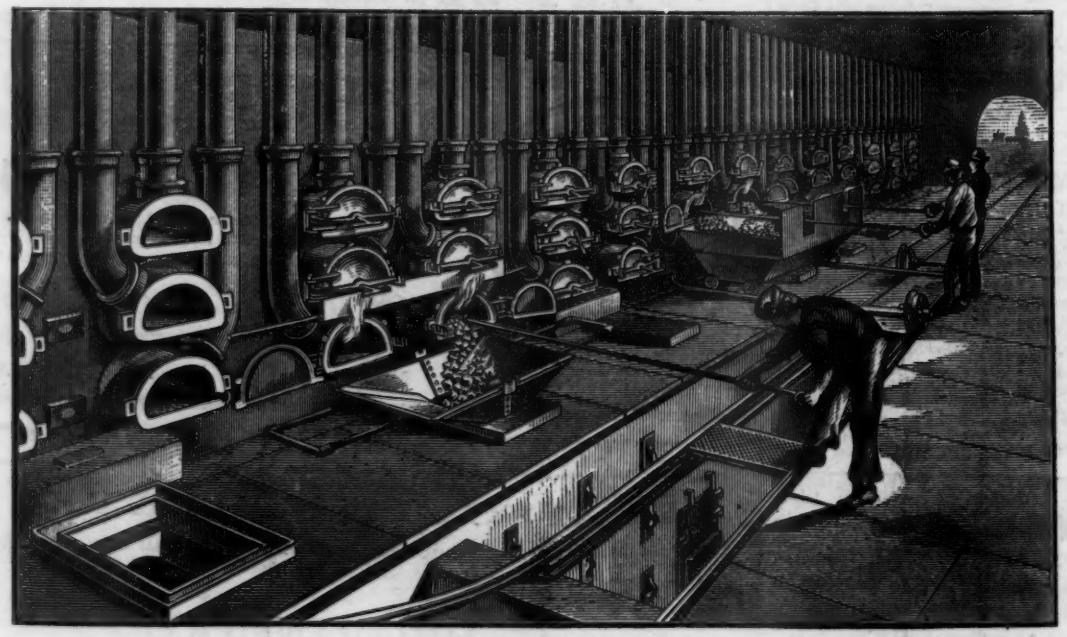

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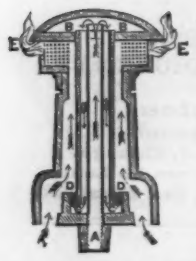

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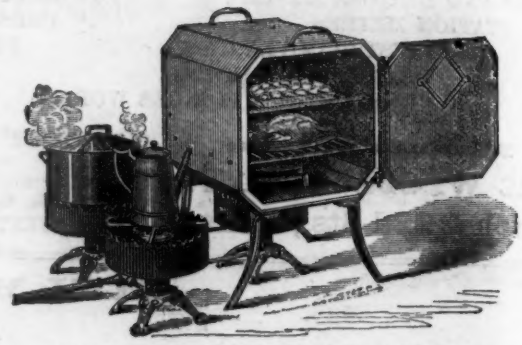

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